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Author(s): Brooks, M.R. and Pallis, A.A.

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# **ASSESSING PORT GOVERNANCE MODELS: PROCESS AND PERFORMANCE COMPONENTS**

**MARY R. BROOKS**

School of Business Administration, Dalhousie University, Canada

[m.brooks@dal.ca](mailto:m.brooks@dal.ca)

&

**ATHANASIOS A. PALLIS**

Department of Shipping and Transport, University of the Aegean, Greece

[apallis@aegean.gr](mailto:apallis@aegean.gr)

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## **Abstract**

This paper develops a conceptual framework that integrates various relevant port performance components in a way that can be used for a comprehensive port evaluation and adjustment of existing port governance models. The paper presents a synthesis of the literature on port governance models and port performance, arguing that the process of change is a dynamic one, and that the performance outcome of a reform process influences the next round of reforms. It also explores the potential for decomposing performance into two different, although related, port performances components, namely efficiency and effectiveness. Bringing into the analysis concepts like the need to integrate users' satisfaction in port performance assessment, the paper explores the content of each of these components and their relationship. This discussion, along with empirical evidence provided by port authorities, leads to the conclusion that governance decisions, both at firm and government levels, are largely based on a very limited assessment of port performance. The effectiveness of port reform is largely neglected, with user perspectives not being an integral part of an effort to improve performance by the port or as feedback to assess the effectiveness of the governance model imposed by the government's port policy.

**Keywords:** *Port, governance, port performance, efficiency, effectiveness, reform*

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## **1. Introduction**

The recent worldwide trend towards port devolution has generated research interest in studying port governance models and their implications for port performance. In this context, [1] proposed a generic environment-strategy-structure configuration, and they concluded that the discussion of port performance needed to be considered as a product of these inputs. Inspired by this concept, a number of scholars formed the Port Performance Research Network (PPRN) to engage in worldwide research, the ultimate goal of which was to understand whether many of the sector's problems in the post-devolution period could be attributed to mismatched (or inappropriate) configurations. The qualitative and quantitative research that was conducted [2] provides evidence of a much greater range of existing/potential port governance typologies than had been contemplated by previous authors [3, 4]. Moreover, the research about performance outcomes that these inputs (port governance models) produced remains inconclusive. None of the 14 national port reform programs examined [5] stands as an unqualified success, while a comprehensive performance assessment of these reforms remains to be completed.

Building on this earlier research by the PPRN [6], the key objective of this paper is to examine the process of port reform, and to explore in greater depth the way that ports measure their performance, and whether that measurement is related to particular port governance approaches. The aim is to advance the development of a conceptual framework that integrates various relevant port performance components in a way that can be used for a comprehensive port evaluation and adjustment of the existing governance models. The paper focuses on (a) the relevant variables to be used as performance measures depending on the model in place and (b) the agencies (stakeholders, authorities, governmental and non-governmental third parties or even port users) that might be the collectors and/or source of this information.

To achieve these aims, the paper provides the outcome of a synthesis of the literature on (a) port governance models and (b) industrial and port performance, arguing that within the process of change, the latter contributes substantially to the realignment and, possibly eventually, the reform of the former. A major theme is the fact that the considerable number of studies dealing with port performance focus primarily on the efficiency aspect of port performance. This is particularly true of the performance data collected by ports. Governance decisions, both at firm and government levels, are largely based on this partial assessment of port performance. The effectiveness of port reform is

largely neglected. This paper considers the measurement of reform effectiveness as an input to the evaluation of the reform outcome.

There are a number of studies that endorse a user (buyer of services) approach and study port selection [7, 8, 9, 10] or port attractiveness [11]. However, user perspectives are approached ‘passively’ (in other words, as a variable determining the choices) rather than as an active moderating influence on the government’s port reform process or on the port’s decisions to improve its own performance. Both are still, for the most part, missing in the port literature.

## **2. The Input: Governance**

In recent decades, extensive port reforms have challenged the conventional models of port organisation [12]. A number of governments in both developed and developing countries [2, 13, 14, 15] adopted alternative service delivery models and devolved port operational responsibility and sometimes port assets to local public (decentralized) entities or to private and/or commercially driven port entities. Some of these port entities are now listed on international stock markets. In several cases, the public sector retains only a supervisory and monitoring role; in others like the UK, there is no national port monitoring agency.

Aiming to address these institutional changes, scholars redirected discussions on port models from the issue of ownership towards alternate governance approaches [2, 16, 17, 18, 19]. Brooks and Cullinane provided evidence of a full spectrum of models that range from fully publicly- to fully privately-managed port activities [20]. The PPRN’s survey of 42 ports produced 34 different combinations of governance along the private-public continuum, with four ports being the only ones operating under a fully public model, and only one port being fully private. Contrary to what would have been anticipated, even the UK ports presented an array of “mixed” governance models in the management of port activities.

Notteboom and Winkelmanns included in the notion of governance the management of stakeholders’ relations (internal, external, public policy, and community) [17]. Concentrating on the logistics integration in ports, as well as on the importance of inland freight distribution, Notteboom and Rodrigue argued that the hinterland ‘regionalization’ of the sector demands new approaches to port governance [21]. De Langen suggested that an analysis of the mix of stakeholder management approaches in a port cluster would add

to the understanding of port competition and performance [22]. This is because the levels and the scope of coordination beyond price, in short the quality of governance, differs between clusters. Opportunistic behaviours could limit trust and the presence of an infrastructure for solving problems of collective action [23]. Wang and Slack suggested that a broader concept drawing from the social sciences that would allow for greater weight of social and cultural variables [18]. Their notion of port governance included three axes, namely spatial-jurisdictional scales, stakeholder community, and logistical capabilities. All of these variables direct governments towards a cluster approach to port governance.

In a different vein, Baltazar and Brooks endorsed a corporate governance approach to analyse port governance [1, 24]. This concept draws on three streams of research—namely strategic management, organisation theory, and configuration theory—and is focused on the (inter)actions of two institutions, the responsible government department (ministry or other relevant policy-actors) and the port authority responsible for the management and operation of the port. The authors put forward the notion that the port governance model is defined by the configuration of three inputs: (a) the *strategy* (in other words, the objectives, the decisions about its product-market scope, and the plan for effecting these) of the port, as developed by the port authority (PA); (b) the *structure*, which is implemented as a result of government regulations and policies, and the strategy chosen by the PA; and (c) the *environment* in which a port operates represent, which has both controllable and uncontrollable factors. These inputs produce an output (*performance*), the quality of which results from the consistency or fit of the inputs when taken together. One of the configurations with ‘fit’ is marked by an environment of low uncertainty, low complexity and dynamism, an efficiency-oriented strategy that focuses on delivery of the basic services, and a mechanistic structure of centralised decision-making characterised by procedural standardisation; to determine if this port is successful in optimizing its performance, the performance must be measured against its efficiency-seeking objectives. A second configuration with ‘fit’ is marked by a highly uncertain environment, an effectiveness-oriented strategy offering peripheral products and services in addition to basic services, and an organic structure of decentralised decision-making; this configuration’s success is better determined by measuring effectiveness. Port performance is, therefore, the ‘output’ of any, fitting or not, governance configuration. That is, those ports mandated with dual objectives by government will find it difficult to

optimise performance, having been forced to choose performance measures from both fields and, therefore, continuously weigh whether they are more interested in achieving efficiency or effectiveness in their operations for those they serve (be that government or shareholders or the local community).

The overwhelming conclusions from research to date are simple:

1. the combination of the inputs does not always result in fit and therefore in optimal performance based on the port's objectives; and
2. while governments may have had the best of intentions in establishing a more commercialised footing for port operations, the program of reform has not always delivered the full benefits sought.

How can this situation be corrected? There is a need to detail the links between the governance model (as an input) and its performance (or output). Having a good theoretical knowledge of the former, there is scope to detail the latter. It is also important to know whether ports are aware of the produced deficiencies (i.e., do they measure the total of the performance components or part only) and whether (and how) they really use the collected performance components in a comprehensive way, for example to realign the components of their particular governance model in practice.

### **3. The Objective: Linking 'Inputs' and 'Outputs' of Port Governance**

The output of these inputs is the performance of the port, with performance deficiencies partially being the by-products of inconsistent governance frameworks. This might be the case because of flaws in the designed governance framework, or because frameworks appropriate to a particular government's objectives have not been imposed as anticipated. It is important, therefore, that governments know how the models have failed to deliver a well-performing port reform program (if indeed that is the conclusion drawn in a particular country or port system). A prerequisite is to detail the exact components of this performance, the agents to measure these components, and, depending on the strategic intent of the port, the choice of the performance components to be prioritised.

#### **3.1 The Process**

Figure 1 provides a feedback loop through evaluation of performance to the contemplation of opportunities for additional port reform. Within a process that unfolds over time each output (performance), along with the contextual environment, provides the

background for the initiation of governance adjustments aiming to minimally adjust, or comprehensively reform, the specifics of the governance model in place.

**Figure 1 about here**

Motivated by the conditions of a port, as well as the environment in which this port operates, government agencies and/or other relevant policy actors decide to initiate change at ( $t_1$ ). These decisions are made in the light of a specific environment at that time, with decision-makers, whether port authorities or government, having a vision of what they would like to see as port performance output.

These governance decisions, which might or might not be associated with PA choices, generate a process wherein PAs act at a certain period ( $t_2$ ) in order to develop their objectives and implement the strategy and structures (systems and processes) to execute the decisions. This requires time. Delmas and Tokat note that policy-makers in deregulation decisions often underestimate the time required [25], and the transition period may last more than 10 years [26]. Even when the governance model is fully implemented ( $t_3$ ), estimations of its output are not instantly possible. Change demands both a cultural and operational adjustment by all those involved in the development and management of port services/activities, and perhaps respective adjustments by other stakeholders. Given that most port reform programs also include deregulation efforts, Brooks and Cullinane concluded that “the period of transition for the world’s port industry is likely not yet over, as many have entered their new governance environment within the past decade” [27, p. 634]. It is clear, however, that all these changes are accompanied by lengthy, transition times ( $t_4$ ).

Only after this transition period, it is possible to accurately understand how the model performs. Performance assessments should take this into account and allow for the essential time lag between the initiation of a governance change and the measurement of the outcome of this change. Measuring the performance (output) at ( $t_5$ ) and informed by changes in the economic environment (defined partially by previous governance decisions that reform objectives and regulatory frameworks, and partially by exogenous variables), PAs and relevant government agencies and/or other actors can reach decisions for adjusting previous governance choices (at  $t_2$ ) and processes ( $t_6$ ): Governance modifications will then continue to result in performance changes and vice-versa. Linking

to performance and port devolution will complete the picture the performance–governance debate and map a future research agenda to assist government and port authorities in determining future alignments to achieve the desired outcome.

Of course, in order to complete the process, PAs and other relevant actors need to establish the essential performance monitoring practices. To give an example, port reforms are a recent phenomenon, generated by exogenous factors (changing economic environment) and endogenous changes (new transportation methods; new technologies; and outdated models of governance) that informed policy change. According to the conceptualization by van Patot [28] of the making of transport policies, the existing economic situation in the sector forms the basis for the actions of authorities, and thus the framework within which policy makers must take their decisions. That is, they judge the present situation and indicate the situation to be expected in the future. Following their principles, they then target a desired outcome and apply those means within their powers and competencies to change the situation. Implementing this rational approach implies that it would have been useful for port authorities or any other governing body to have measured the situation prior to  $t_1$  (i.e., pre-reform time) but, as illustrated by the cases in Brooks and Cullinane [2], this has not happened. In fact, it appears that the absence of a complete performance measurement link continues through to the post-reform era, making it not only difficult to judge the post-reform of any particular port but also the performance of the entire devolution program a government might have taken.

#### **4. The Output: Performance**

##### **4.1 Efficiency**

Thirty years ago, the seminal UNCTAD monograph on port performance indicators included berth occupancy, revenue per ton of cargo, capital equipment expenditure per ton of cargo, turn-around time and number of gangs employed [29]. Following this path, a number of past studies attempted to capture the performance of port activities focusing mainly on operational efficiency and proposed the implementation of an operating index [30, 31, 32]. In recent years, scholars have increasingly used Data Envelopment Analysis (DEA) to analyse port production [33]. Such efficiency indicators are important, since terminals stand as the most essential port function in transport chains.

Efficiency performance measures relate to the physical quantities of items, levels of effort expended, scale or scope of activities, and the efficiency in converting resources

into some kind of product (or service). The most common outcome measures relate, in private corporations, mostly to the financial viability of the firm (e.g., profit extracted from the revenue from operations). To extract the greatest financial return, efficiency-oriented companies focus on measures of asset utilization. The purpose of improved operations is to expand the gross margin extracted. Measurements of performance for efficiency-focused ports tend to benchmark financial, system-wide, and production and marketing activities against prior year performance and against competitor performance in order to deliver efficiency objectives. However, scale development for efficiency measures is well advanced and there is little contribution to new knowledge for those interested in performance measurement from the scale development perspective.

## **4.2 Effectiveness**

Improved efficiency does not necessarily lead to improved competitiveness [11], for competitiveness is a product of effectiveness in delivering in desired services to users. Efficiency and effectiveness are related concepts. If a terminal operator wishes to improve its cargo-handling efficiency so as to improve berth utilization through faster vessel turnaround, it may also improve its effectiveness as vessel time at berth drops and the customer may be more satisfied. However, if terminal operator improves its asset utilization by leaving more vessels at anchor so as to minimize downtime, its utilization is improved but the customer's service expectations may not have been met. In this case efficiency has come at the expense of effectiveness. Various stakeholders may have different performance objectives in this illustration. Effectiveness is related to the objectives of those seeking it.

Effectiveness-oriented PAs tend to be more customer-focused. Effectiveness measures relate to how well the firm or agency uses its strategies, structures, and task environment to meet its mission and stated goals. If one of the goals is profit-maximizing in an effectiveness-oriented PA, there will be a companion goal of developing and retaining those customers who generate the greatest margins, while "firing" those who are not profitable. There is no interest within the effectiveness-oriented PA of serving unprofitable customers unless it is part of the PA's government-imposed mandate (in which case the PA will seek a subsidy to offset its losses). There is, however, the stakeholder view that if you take care of the customer, your employees, and stakeholders, the shareholders will be taken care of over the long-term because profitability will accrue to solutions-driven, customer-focused organisations. For ports, effectiveness-oriented

performance is related to the quality of services provided to transportation users. Quality-of-service measures are extremely important because they represent the “bottom line” for the customers. The efficiency perspective is important because it can be used to improve operations, but it is only secondary. User satisfaction is one of the critical performance indicators that must be measured in an effectiveness-focused organization [34].

Searching for a long-term strategy, the European Commission since 1997 has put the improvement of port efficiency as the major goal of the EU port policy [35]. It has failed however to address issues that may improve both efficiency and effectiveness, such as documentation simplification, and harmonised customs procedures, that would enhance users’ satisfaction. In the absence of customer-focused improvements, and despite the fact that some of the North European ports are among the most productive ports worldwide (i.e. in terms of TEU per quay length, and TEU per terminal area) [36], the use of short-sea shipping at the expense of other transport modes has been a policy target that has yet to be fully accomplished. In the absence of a performance monitoring system at “firm” (PA) level, and with such problems yet to be addressed, the European Commission recently suggested [37] that there is a need for alternative ‘generic’ indicators, beyond efficiency indicators, in order to address issues like spatial and ‘green’ port development as well as providing a mechanism for introducing port users’ perception of European ports performance to decision making. In addition, an efficiency focus in government policy is not the path to delivery of social public benefits. Once objectives are set, such as those seeking reduced air pollution or reduced congestion or greater local employment, the effectiveness of meeting those objectives can be measured.

Many studies present measures of effectiveness—they are often found in the lists of criteria—but then fail to examine them fully. The problem is that, while efficiency may be absolute and therefore measurable using a method like DEA (already discussed) or SFA (stochastic frontier analysis), effectiveness is measured relative to the objectives being sought. For example, Ng, in his study assessing attractiveness in the North European container transshipment market, identifies 21 different factors ranging from (perceived) service quality to legislation and pure monetary costs [11]. He emphasises the highly divided theme of ‘what factors’ or ‘package of factors’ to be included in performance assessment in order to capture the relationship between improved service quality and altered port competitiveness. The study confirms significant divergences in

users' opinions on different factors. This is because it does not capture the objectives of the users or those of the port.

### **4.3 Merits of Thinking of Performance Components**

The addition of performance indicators, other than simply operational ones, is a key suggestion in recent port research [34, 38, 39]. Bichou noted that performance is a broad concept that covers almost any objective of operational management and competitive excellence of a firm and its activities [40]. Depicting the taxonomy of the performance measurement dimensions, he suggested that efficiency and utilisation dimensions interact with quality and effectiveness. He also pointed out that little has emerged on linking and integrating operations design and strategy within the multi-institutional and cross-functional port sector. Based on the complexity of the contemporary port product, de Langen *et al* suggested that port authorities should apply a multifaceted examination of different performance components grounded on the distinction between cargo transfer, port logistics and port manufacturing product and the development of several respective performance indicators; this is not least because the users of these products and the respective selection criteria differ substantially [41].

The next stage is, therefore, to tailor performance measurement and communication of performance measures to specific objectives. If a port also desires to respond to stakeholders, then performance measures need to focus on the linkage between expectations and performance, that is satisfaction.

In conclusion, Figure 1 indicates that the process of evaluating port performance begins by understanding the objectives of both the government's port reform process and the objectives of the Port Authority's configuration. Linking outcomes to objectives enables the feedback mechanism to work for the next cycle of review. If the government believes its objectives have been met, the port is pleased with its performance and stakeholders are satisfied with the outcome, there will be little tension over the port's performance and little impetus to make any changes. If, on the other hand, any of the parties are dissatisfied with port performance outcomes, e.g. their objectives have not been met, there will be a groundswell of interest in making changes to government policy, the imposed port governance model, the way that the PA configures itself in response to the imposed model (and accompanying regulation), or the management team. There will be a temptation to engage in political interference if government is not pleased with

performance, to engage in lobbying government if stakeholders are not pleased, or for customers or employees to ‘exit’ if the situation becomes unacceptable. The total of the efficiency performance and the effectiveness performance is linked to informing future port reform decisions.

#### **4.4 A Process for Evaluating Effectiveness**

##### ***Step 1: Define customer (buyer/user/stakeholder).***

In most studies, scholars consider the carrier as the port’s primary customer (the buyer). However, in cases where a port is specified in the transport contract or the goods’ contract of sale, the manufacturer or the freight forwarder (including 3PLs or 4PLs) or the consignee are also buyers depending on who has responsibility for making that purchase choice. As a second group, there are those that are actively involved in the supply chain by providing port-related activities in wider geographical locations (i.e. operators of intermodal distribution centres, providers of port-related value-added services or value added logistics). Given the incursion of ocean carriers into land-based logistics activities, the role of the carrier in port selection may be even stronger than previously considered. Thus, their perceptions are also of considerable significance [42], given the emerging geographical and functional integration of ports in wider supply chains and logistics pathways [21] and the transformation of ports to elements embedded in value-driven multifaceted chains [43, 44], which compete for attracting users located in overlapping hinterlands. In a recent study, de Langen proposes the idea of measuring the preferences of the ‘hinterland’ decider of port selection [10]. This second group is considered by some port authorities as included in the category of customers (although they may not be buyers and pay for the services provided) but more frequently are considered stakeholders, parties with an interest in the activities of ports. This implies an understanding of the different subcategories of users and actors involved in deciding which port or even mode to use for completing a transportation process. Problematically, many scholars include academic ‘experts’ in their studies as arbiters of what is to be chosen when they have no role other than that of interested observer.

##### ***Step 2: Identify the attributes (decision criteria) of importance to the user/buyer.***

Lirn *et al* [8, Table 1] identify 47 criteria they group into four, using Delphi techniques to reduce the 47 to a manageable number of 12 [46]. A variation is that the attributes may be

‘weighted’ by the user; Lirn *et al* do this. A weighted set of attributes can yield a composite scale reflecting the specific attributes desired by a particular user sub-group. Ng correctly notes that “[D]ifferent scholars try to interpret the issue based on self-beliefs on what exactly port attractiveness is about and thus causing confusion.” [11, p. 237] It is the contention of Brooks [46] and supported by Lirn *et al* [8] that importance is an insufficient condition to explain choice. It is merely a beginning. Unfortunately, many scholars conclude their research at this point.

Furthermore, the attributes of importance cannot be useful when statically evaluated at a single point of time. Port performance is dynamic; this indicates that attribute evaluation is a periodic activity, to be conducted at regular intervals. A dynamic evaluation of these attributes would allow the port to develop a better understanding of the changing perceptions of the users, thereby providing feedback to strategy as it evolves over time.

***Step 3: Supplier (port) evaluation of own performance on the attributes (decision-criteria).***

This evaluation may be in terms of quantifiable product benefit attributes or service delivery attributes. What is service quality and how do is it measured? Do ports measure service quality? Brooks and Cullinane indicate that very little measurement of service quality is undertaken, and few ports in the 42 sampled added service quality indicators to the listed performance measures [20]. The additional empirical evidence provided in Section 5 of this paper supports this conclusion.

Notably, these two exercises have a reference to ports above a 2 million tonnes per year traffic threshold and 40% international traffic, while both the port literature [47] and port reports have a ‘container focus’. The latter is indicative of the dearth of performance measurement in other port markets, apart from counting numbers of tonnes, passengers, or vessels transiting/calling a port. For instance, we know very little about who measures performance of passenger terminals, and how they do so; one exception is the recent Pantouvakis study of passengers’ perception of quality [48]. The focus of scholars on container terminals suggests there is a gap to be filled both in theoretical and practical terms.

There are two uses for this data: (1) performance is measured against the importance to buyer so that performance gaps can be identified for improvement; (2) performance is

measured against the performance of other ports so that performance gaps can be identified in developing a port's strategic response. Lirn *et al* collect this for six container ports on a five-point Likert scale [8]. It is most credible if this evaluation is undertaken by a third party, either contracted or scholarly [49].

#### ***Step 4: Buyer/user evaluation of the particular port's performance***

Ng attempted to conduct a similar approach to assessing performance in light of relevant attributes [11]. While the terminology was different, he began by evaluating those factors of significance to the port choice decision. Eschewing the established marketing literature terminology of "importance" scores, he established a set of criteria scores for their significance to the decision as seen by the buyers. He then asked users to rate each of six ports in the LeHavre–Hamburg range in North Europe on these dimensions. In essence, he combined importance and performance for six ports, as did Lirn *et al* [8], but with a completely different set of scales. He did not adopt the recognised Aaker and Day model, supported by Lirn *et al* [7, 8], Brooks [46] or Mangan [50], that noted that, at minimum, the decision is a function of importance and performance, and, at best, more. The six variables scoring more than 4.0 are: accessibility of the port (4.47), time efficiency (4.42), cases of delay in loading/unloading containers (4.42), cost (terminal handling charge and port dues) (4.26), speed in responding to a liner's new demands (4.05), and geographical location (4.00) [51]. It would have been useful to examine the performance of these ports on the top ranking significance scores.

Lirn *et al* also collected performance ratings from a user perspective, and thus were able to do pair-wise comparison of importance and performance factors [8]. As Brooks had noted, this only reveals the potential set of determinants, as a determinant attribute must be both important and perceived to be different, as well as correlated to the decision [52]. This last point has somehow been lost.

The final part of this step is to collect an overall user satisfaction score as user satisfaction is one measure of effectiveness in delivering the expected service. While the previous importance–performance assessment provides an indication of where performance gaps may occur, the satisfaction rating will uncover the user's predisposition for port facility support. Users who feel captive will use the opportunity to indicate their disgruntlement out of line with the findings of the gap analysis. Overall user satisfaction is not an indication of future choice behaviour as satisfied customers may still switch to a

competitor. If a customer is satisfied, they choose to stay (not switch) or they may cease to, for the time being, evaluate competing options. It is also a measure that acts as a proxy for user concerns about PA discrimination, political interference, non-delivery of promised services or poor responsiveness, theft or loss and damage experience, investments not made on a timely basis, and so on. There is very little evidence of user satisfaction being collected (to be discussed later) by ports.

#### **4.5 Discussion**

To recap, Brooks indicated that decision determinants have, as a pre-requisite, a high importance score and a perceived difference in performance [46]. In other words, in Lirn *et al's* Table 6, the criteria could not a choice determinant unless it was high in importance [8]. In their assessment of transshipment ports, four factors are in the determinant quadrant. Of these, Handling Cost of Containers is of the highest importance (and is also perceived as different between options) and Basic Infrastructure Condition exhibits the greatest perceived difference in performance. Both of these are possible determinants of choice. The remaining two, Proximity to Main Navigation Routes and Proximity to Feeder Ports, are both important and differentiated, but are not discussed because they are beyond the port's control to change. This does not diminish their impact however.

While it is important to measure performance, the critical question is: are the attributes in existing studies sufficient for examining outcomes in both efficiency-oriented and effectiveness-oriented configurations? In other words, for example, are the 47 attributes that Lirn *et al* [8] initially examined all-inclusive of those in the decision-making process? Their criteria are generally focused on efficiency criteria as reported in the literature review. Perhaps most interesting is that the list does not include service dimensions, such as sales representative service, commitment to resolving the user's problems, invoice accuracy, terminal theft, or the ability of the port to be flexible in its service offering. The list is definitely incomplete without a satisfaction scale as customer dissatisfaction is a major cause of customer defection [53].

Perhaps most important for the purposes of this paper, Ng [11, p. 247] rightly noted that “many researchers tend to mix up ‘attractiveness’ with ‘competitiveness’ ... [that is they] assume that a port's service level is directly proportional to port competitiveness.” He concluded that “attractiveness is only a pre-requisite to allow a port to achieve

competitiveness” [11, p. 248]. This second point is true, and underpins the works of Lirn *et al* [7, 8] and predecessors. While important or significant attributes may guide a user to consider a port and perceived difference between ports may lead to the choice of one over another, expectations of performance if not met, may result in negative disconfirmation or, if met, in positive disconfirmation [54]. The resulting performance may or may not lead to satisfaction, and future choice. The link between satisfaction and future choice is not proven; in the marketing literature, choices are often a product of other reasons. However, all else equal, choices tend to favour the party with whom one has a satisfactory relationship.

## **5. Empirical Indications of what is Measured**

The next issue that needs to be explored and put in perspective is what is actually measured by the (recently devolved, in most cases) port authorities and how the latter use this measurement. A first set of indications was collected by the PPRN and analyzed in Brooks and Cullinane [2]. This section discusses a further set of data that has been provided by 12 port authorities in five countries (Italy, Canada, Korea, USA, and the UK) that participated in the PPRN exercise via the completion of an additional questionnaire.

These 12 port managers were asked to provide information regarding their governance models and the performance measurement practices that they follow. Our intent was to link the collected performance with certain types of port goals and port governance models. The replies suggest that port authorities remain focused on some types of performance only. In fact, the number of indicators reported (or the Port Authorities were willing to disclose) is substantially lower than expected. As the replying PAs are responsible for ports whose annual cargo traffic exceeds the threshold of 2 million tonnes per year and 40% international traffic, it can be assumed that these would have the appropriate resources to collect data considered essential. However, only seven of the 12 answered the performance measurement part of the questionnaire! We concluded that this is a clear sign that comprehensive performance measurement programs are not practiced in a substantial number of ports.

Brooks noted that ports in total implement fewer performance measurements programs than do airports [34]. Further investigation into the data from 41 port replies received by PPRN researchers (Table 1) that led to this conclusion reveals that performance measurement programs are limited and this is a general situation that takes

place irrespective of the strategic intent of the port. However, when ports have a clear economic objective, which means that they have as their only stated goal either to maximise profits for stakeholders or maximize return on investment by government, performance measurements programs are further limited.

**Table 1 about here**

Environmental management (e.g., ISO 14000) and quality management systems (e.g., ISO 9000; BS5750 or similar) seem to be the ‘performance measurement’ programs that are employed more frequently than others. However, this happens more frequently in the case of ports that have non-economic goals (either exclusively, or in combination with economic goals) rather than in the case of ports that have solely economic goals. Non-economic goals might include traffic throughput maximization, and optimization of local or national economic development prospects. In fact, quality management systems are extensively implemented in ports with a mixed strategic intent. Other performance management practices, including Activity Based Costing, Balanced Scorecard, and Best Practice Benchmarking, are observed in fewer ports. Finally, Business Process Reengineering and Total Quality Management are rarely applied. The main reason these programs are included in this research is that ports could use these programs as a form of performance measurement; they are really a product of efforts to achieve process improvements or comply with regulatory requirements (or customary practices) but their purposes can be stretched to performance management as well.

Table 2 suggests that, for the 12 port authorities examined, PAs report either to a Board of Directors (BoD), which ensures the good stewardship of the port’s assets, or to a Board of Advisors (BoA) that provides advice and support as needed. This is true for both cases of mixed and public governance models. There is no indication that particular reporting approaches are associated with specific types of governance. With those ports seeking to balance economic and non-economic goals, there is not a clear association between port objectives and the management reporting model. The incidence of management reporting to a department or branch of government, that is responsible for ensuring the good stewardship of the port’s assets or reporting to community groups on a regular basis, are rare. This is being followed in only one of 12 ports. That said, several studies [55, 56] have identified informal, rather than institutionalized, political

interference as a common occurrence in devolved ports, and this is a variable worthy of consideration in performance measurement and management reporting assessments.

### **Table 2 about here**

Corporate governance practices are commonly determined by legislation or letters patent filed with regulatory authorities or agencies (seven out of 12 cases). Explicit regulations, or legislation, were observed in two cases. In the case of one port authority, these laws are accompanied by specific ‘corporate best practices and corporate governance guidelines’.

Responsibility for the financial performance of the port lies extensively with the senior management of the port authority and, only in some cases, with a governmental department. The role of the PA senior management is greater in the case of non-financial performance. Even in the case of public ports, this responsibility has been devolved to port entities, as has, to a lesser extent, financial performance responsibility; only one of three has the port reporting to a government on its financial performance.

Table 2 leads us to conclude that there is little government interest in non-financial performance. As a result, there is weak external pressure on port authorities to examine non-financial performance other than as a way of dealing with customers or stakeholders. Overall, it is the senior management of the port authority that has to measure and assess both the financial and non-financial performance of the port and then (following corporate governance practices that are, in most cases, legally determined) develop governance realignment actions to improve this performance. This, however, does not exclude the potential of the PA management being, at the same time, accountable to another policy actor, whether this is a government department or otherwise.

For those seven ports responding to the performance measurement part of the questionnaire, Tables 3 to 5 illustrate the limited participation of ports in performance measurement. With the exception of financial indicators, there is very little evidence that ports collect, let alone use, either internally or externally, critical operational performance measures, whether the measures relate to vessel operations or cargo operations. The measurement of other variables is rare indeed. A second major finding is the presence of a remarkable inconsistency with respect to what the PAs have assessed as necessary to measure. The latter is true even with respect to financial indicators (Table 3). Excluding

ancillary revenues as a percentage of gross revenues, and terminal charges as a percentage of gross revenue, there is no consistency regarding the other indicators.

### **Tables 3 to 5 about here**

Surprisingly only one of the seven port authorities is involved in a comprehensive measurement of container operations (Table 4). There is a partial explanation for this phenomenon: the use of concessions by landlord ports to manage container terminal operations is already common practice. Still, the sporadic measurement of vessel operations suggests that PAs are not involved in comprehensive performance measurement exercises.

Labour productivity is also not extensively measured (Table 5). There is little, if any, interest in measuring employee turnover rate, employment per tonne or TEU handled, contrary to expectation as a substantial feature of many port reform programs was port labour reform. This further supports the conclusion that performance measurement by the management of port authorities is, in general, rather limited.

Table 5 also illustrates that the seven PAs are rarely engaged in any other performance measurement programs. Indicators like the number of customers served, number of destinations served, or even shipping lines that call the port, are not part of the PA performance measurement agenda. Neither do they measure those service elements that might enhance the satisfaction of the users. For example, neither customer complaints nor invoice accuracy are collected. The only port authority that stated it collects invoice accuracy reported a 100% accuracy, allowing us to question whether this more a qualitative assessment rather than a quantitative measurement. One PA replied that they measure customer satisfaction; however, it failed to report an outcome of this collecting process, merely indicating that its customers are satisfied, thereby raising similar concerns. Furthermore, there is no evidence of stakeholders' satisfaction measurement among the seven. The absence of measurement of stakeholders' satisfaction contradicts the findings of Table 6. On the one hand, port authorities realize that a number of different stakeholders are of substantial importance, with the importance of seven different groups of stakeholders (including local industries and local residents) being remarkably balanced. While three PAs replied positively to the notion that 'they are

involved in stakeholder management,' there does not appear to be a systematic measurement process for stakeholder satisfaction.

**Table 6 about here**

## **6. Conclusions**

The key objective of this paper was to advance the development of a conceptual framework that integrates various relevant port performance components in a way that can be used for a comprehensive port evaluation and adjustment of the existing governance models. The paper argues that change is a process, wherein performance contributes substantially to the realignment and, possibly eventually, the reform of the governance models in place. The recent emphasis on port governance has identified a number of different port governance configurations. Governments and relevant (in several cases, newly devolved) port authorities, have implemented these reforms, and a considerable transition period has already taken place; now governments need to ensure that ports perform well and achieve the objectives that have been set for them. In many cases, a sufficient period of time has now passed to evaluate the impact of port reforms.

In order to reach this stage, the paper discusses the merits of decomposing performance into two different, although related components, namely *efficiency* and *effectiveness*. While not denying the importance of the first one, it argues in favour of bringing effectiveness into the measurement of performance in a greater way than has been the case to date. It also suggests that associating different types of performance measurement with different models of port governance can be particularly useful. In particular, there is the case of effectiveness-oriented PAs, which tend to be more customer-focused, and the need for them to engage in more focused measurement activities. Thus, user perspectives should be an integral part of their effort to improve port performance and, as feedback, to assess the effectiveness of the governance model imposed by the government's port policy.

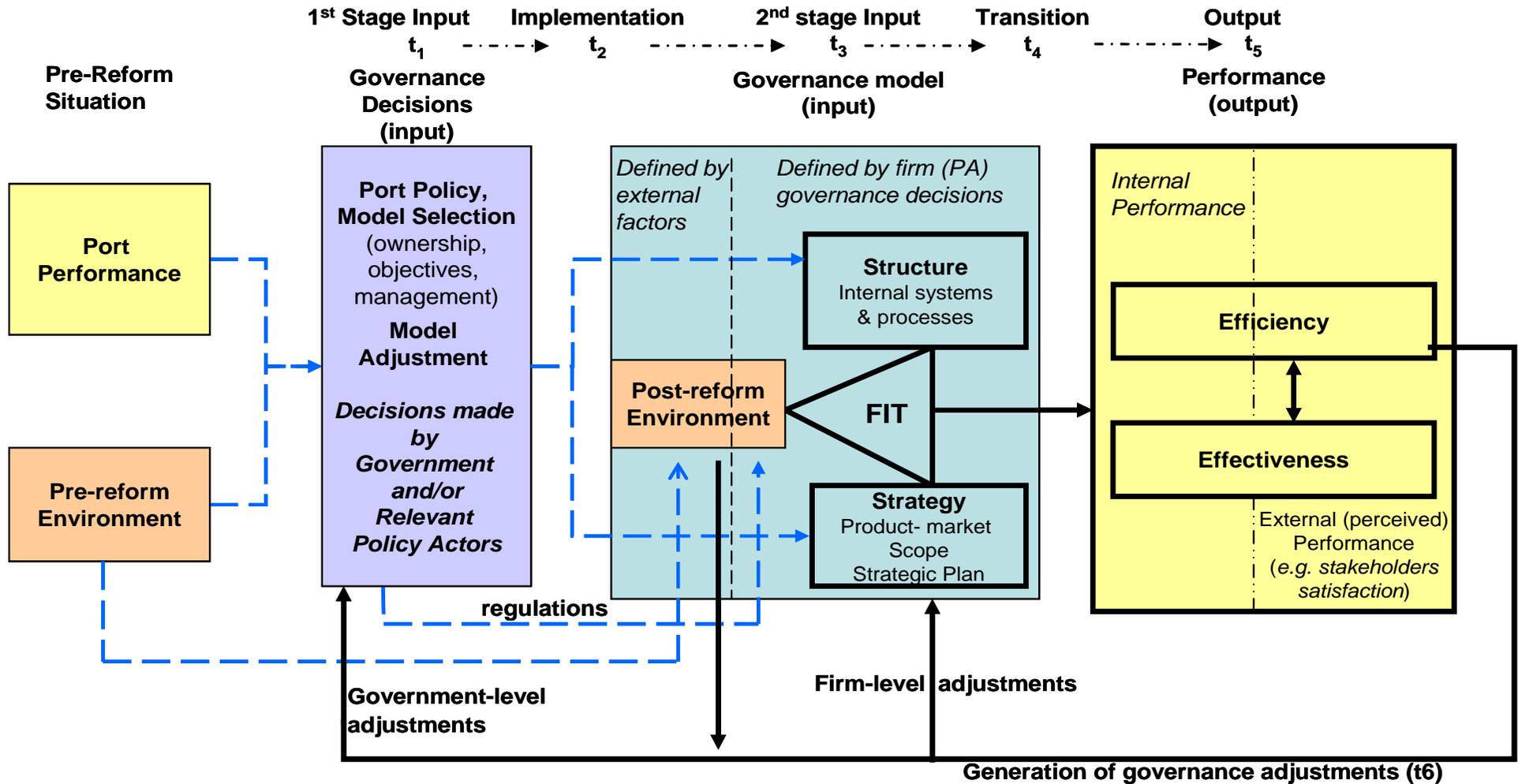
Given the extensive literature on efficiency, this paper concentrated on further developing the 'missing variable' of port performance discussion—the evaluation of effectiveness. In particular, the paper suggested a four-stage process, that includes (a) definition of the user; (b) identification of the attributes of importance to the user/buyer;

(c) evaluation of a supplier (port) own performance on the attributes; and (d) a buyer/user evaluation of the particular port's performance. The discussion of the third stage is something that has not been explored, and port studies commonly focus on port users' importance decision criteria. The scope for further research is considerable, in order to identify how ports with different configurations could proceed to such evaluation (indicators, process), and then to decide what it should do, in terms of governance realignment, following such performance evaluation.

The paper also examined empirical data in order to put into perspective what is actually measured by the Port Authorities and how they use this data. The findings were that ports currently collect even fewer performance measurements than expected. Moreover, there are not any consistent patterns relating a port's strategic intent, with its governance model and performance measurement and assessment activities. Beyond financial indicators, those actors that have assumed responsibility for devolved ports' financial and not-financial performance are not engaged in extensive performance measurement practices. Users' perspectives and levels of satisfaction are among the most neglected issues.

It has to be noted that these conclusions are drawn based on a data-set provided by 12 ports in five countries, with all of them having an annual traffic of two million tones and above, and 40% international traffic. This means that further data collection is essential to confirm or refute such conclusions, in order to have a complete picture of what performance measurement practices are in application. This research is the first step in evaluating port reform programs by governments, and in laying out a template for consideration of their future performance measurement activities by port authorities.

**Figure 1. Linking Governance and Performance**



- Process before the implementation of a new governance model ( $t_0 - t_3$ ;  $t_6 - t_9$ ; etc)
- Configuration of the new Governance Model and Process after its setting ( $t_3 - t_6$ ;  $t_9 - t_{12}$ ; etc)

**Table 1. Performance measurement programs and techniques in use by 41 ports**

<b>Strategic Intent</b>	<b>Economic (n=11)</b>	<b>Non-Economic (n=19)</b>	<b>Mixed (n=11)</b>
Activity based costing	18%	26%	27%
Balanced scorecard	18%	21%	9%
Best practice benchmarking	18%	26%	27%
Business process re-engineering	9%	11%	9%
Environmental management systems (e.g., ISO 14000)	36%	42%	55%
Quality management systems (e.g., ISO 9000; BS5750 or similar)	36%	42%	73%
Total quality management (TQM)	9%	11%	18%
Other	0%	11%	0%

**Economic Strategic intent:** Ports having as only goal either to maximize profits for shareholders; or maximise return on investment for government;

**Non-Economic Strategic Intent:** ports only goal is to maximize traffic throughput; or maximise throughput subject to a maximum allowable operating deficit; or optimize local or national economic development prospects;

**Mixed:** A combination of the above goals or any other non-economic goal.

**Table 2. Performance measurement programs and techniques in use (n=12)**

<b>Goal</b>	<b>Governance</b>	<b>Management Reporting Model</b>	<b>Corporate Governance Practices Determined</b>	<b>Responsibility for Financial Performance</b>	<b>Responsibility for Non-financial Performance</b>
Balanced	Public	BoA	Regulation	Sr. Mgmt.	Sr. Mgmt.
Balanced	Public	BoA	Laws/ Regulation	Sr. Mgmt.	Sr. Mgmt.
Balanced	Public	BoD	Laws	Government	Sr. Mgmt.
Balanced	Mixed	BoA	Regulation	Sr. Mgmt.	Sr. Mgmt.
Balanced	Mixed	Group	Legislation	Government	-
Balanced	Mixed	BoD	Laws	Sr. Mgmt.	Sr. Mgmt.
Balanced	Mixed	BoD	Laws	Sr. Mgmt.	Sr. Mgmt.
Not stated	Mixed	BoA	Laws	Government	Government/ Private
Not stated	Mixed	BoD	Laws	Sr. Mgmt.	Sr. Mgmt.
Not stated	Mixed	BoD	Laws & CBPCG	Sr. Mgmt.	Sr. Mgmt.
Economic	Private	BoA	Legislation	Sr. Mgmt.	Sr. Mgmt.
Not stated	Not stated	BoD / Gov. Department	Laws	Government	Sr. Mgmt.

**BoD:** Management reports to a Board of Directors who ensure the good stewardship or the port's assets;

**BoA:** Management reports to a Board of Advisors who provide advice and support as needed;

**Gov Dep:** Management reports to a department or branch of government (or a Government Minister) who is responsible for ensuring the good stewardship of the port's assets;

**Group:** Management reports to community groups on a regular basis.

**Sr. Mgmt.:** Senior Management;

**Laws:** By-Laws, Letters Patent, filed with regulatory authority or agency;

**Legislation:** By national, regional or local legislation;

**Regulation:** By Regulation;

**CBPCG:** Corporate best practices and corporate governance guidelines.

**7. TABLE 3. WHAT DO PORTS ACTUALLY MEASURE? (FINANCIAL INDICATORS, N=7)**

<b>PORT</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>	<b>F</b>	<b>G</b>
<b>GOAL</b>	<b>Balanced</b>	<b>Balanced</b>	<b>Balanced</b>	<b>Balanced</b>	-	-	<b>Profits/ return</b>
<b>GOVERNANCE</b>	<b>Mixed</b>	<b>Mixed</b>	<b>Mixed</b>	<b>Public</b>	<b>Mixed</b>	<b>Mixed</b>	<b>Private</b>
Ancillary revenue as % of gross revenue	<b>R</b>	N		<b>Y</b>	<b>R</b>	<b>R</b>	
Ancillary profit as % of net profit	N	N		<b>Y</b>	<b>R</b>	N	
Average days accounts receivable	N	<b>R</b>		<b>Y</b>		<b>R</b>	
Capital expenditure as % of gross revenue	N	N		<b>Y</b>		N	
Debt: equity ratio	<b>R</b>	N		<b>Y</b>		N	
Growth in profit (before taxes)	N	<b>R</b>		<b>Y</b>		N	
Interest coverage ratio	N	N	<b>Y</b>	N		<b>R</b>	
Percent of port revenue from outsourced activities	N	N		N		N	<b>R</b>
Port-related profit as % of port-related revenue	N	N		<b>Y</b>		<b>R</b>	
Return on capital employed	N	N		N		<b>R</b>	
Terminal charges as a % of gross revenue	<b>R</b>	<b>R</b>	<b>R</b>	N		N	
Total revenue collected	N	<b>R</b>		<b>Y</b>		<b>R</b>	
Vessel charges as % of gross revenue	<b>R</b>	<b>R</b>		N		N	
Yield % on share, if publicly traded	N	N		N		N	

R= Collected and Reported to authors;

Y= Collected but not shared;

N = Not collected.

**Table 4. What Do Ports Actually Measure? (Container and Vessels Operations, n=7)**

PORT	A	B	C	D	E	F	G
<b>GOAL</b>	<b>Balanced</b>	<b>Balanced</b>	<b>Balanced</b>	<b>Balanced</b>	-	-	<b>Profits/return</b>
<b>GOVERNANCE</b>	<b>Mixed</b>	<b>Mixed</b>	<b>Mixed</b>	<b>Public</b>	<b>Mixed</b>	<b>Mixed</b>	<b>Private</b>
<b>CONTAINER OPERATIONS</b>							
20' TEU as a % of Total TEU for year	R	N	N	N	R	R	
Average revenue per TEU	N	N	N	N	N		
Average vessel turnaround time per 100 lifts (in hours)	R	N	N	N	N		
Average yard dwell time in hours	R	N	N	N	N		
Container port throughput (TEU/meter of quay/year)	R	N	N	N	N		
Departure cut-off time (hours)	R	N	N	N	N		
Growth in TEU throughput	R	N	N	N	R	R	
Import containers as a % of total containers	R	N	N	N	R	R	
Lifts per crane hour	R	N	N	N	N		
Percent of containers grounded (ship to rail operations only)		N	N	N	N		
Reliability		N	N	N	N		
Transshipment (as % of total throughput)	R	N	N	N	N	R	
Yard hectares to quay meters	R	N	N	N	N		
<b>VESSEL OPERATIONS</b>							
Average turnaround time per vessel		N	N	N	N		Approx
Average vessel calls per week		R	N	N	R		Approx
Average vessel waiting time at anchor		N	N	N	N		N
Berth utilization %		N	N	N	N		N
Hours of equipment downtime per month		R	N	N	N		N
Length of quay in meters (as a capacity measure)		N	N	N	N		N
Revenue per tonne handled		R	N	N	N		N

R= Collected and Reported to authors

Y= Collected but not shared

N= Not collected

Approx: Approximately

**Table 5. What Do Ports Actually Measure? (Other Measures, n=7)**

PORT	A	B	C	D	E	F	G
<b>GOAL</b>	<b>Balanced</b>	<b>Balanced</b>	<b>Balanced</b>	<b>Balanced</b>	-	-	<b>Profits/ return</b>
<b>GOVERNANCE</b>	<b>Mixed</b>	<b>Mixed</b>	<b>Mixed</b>	<b>Public</b>	<b>Mixed</b>	<b>Mixed</b>	<b>Private</b>
Employee turnover rate		N	<b>R</b>	N	<b>R</b>		
Employment (full-time equivalents) per tonne handled		N	N	N	N		
Employment (full-time equivalents) per TEU handled		N	N	N	N		
Destinations served this year		N	<b>R</b>	N	N		
Number of customers served		N	<b>R</b>	N	N		
Number of shipping lines that call		N	N	N	N	<b>R</b>	<b>R</b>
Customer complaints per month		N	N	N	N		
Invoice accuracy percent		N	N	N	N		<b>R</b>
Overall customer satisfaction		N	N	N	<b>Y</b>		Satisfied
Stakeholder satisfaction		N	N	N			Satisfied

R= Collected and Reported to authors

Y= Collected but not shared

No= Not collected

NA= Not apply

“Satisfied” and “Approximately”: Qualitative assessments provided by the responding PA.

**Table 6. Which Stakeholders are Relevant? (n=7)**

<b>Importance (%) to Various Stakeholders over time (n=6) (1)</b>	<b>Transport Firms</b>	<b>Local Industries</b>	<b>End Users</b>	<b>Local Environ. Groups</b>	<b>Local/Reg. Govt</b>	<b>National Government(s)</b>	<b>Local residents</b>
2000	12.9	25.0	14.6	7.0	16.7	14.6	9.3
2005	11.1	24.7	8.8	10.6	21.1	14.4	9.4
2010	10.4	23.3	14.8	11.3	17.4	14.1	8.8
Ports measuring user satisfaction (n=5)	1	1	1	1			
Stakeholder Management (n=5)	3	3	3	3	3	3	3

Note: (1) Another port replied that the only important stakeholder is the National Government.

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49. It is the authors' assumption that a buyer will receive a third-party performance assessment tool (asking for relative qualitative performance assessment of its performance against competing ports) more positively than one from a port authority. If the quantitative assessment can be done at the same time, there is then need of only one standardized instrument. Buyers will rely more on a third party assessment than on one perceived as biased; See also: BROOKS, M. R., 2007, Issues in Measuring Port Devolution Program Performance: A Managerial Perspective. In: *Devolution, Port Governance and Port Performance*, edited by M. R. Brooks and K. Cullinane (London: Elsevier), pp. 599-629.
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51. It is not clear if Ng tested for multi-collinearity before assessing these factors using ANOVA. A number of variables are dropped and F scores given only for a few, which may be because they are the only significant ones or because of some other unstated reason.
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54. Disconfirmation is the difference between pre-purchase expectation and post-purchase performance perception; positive disconfirmation is when performance is better than expected and negative is when the performance does not meet expectations. Delight (high satisfaction) is the extreme of

positive disconfirmation. If disconfirmation is neutral, satisfaction is a product of the level of expectations and performance.

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