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The nexus between port governance and performance

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ABSTRACT

The diversity of port governance models in the world, sometimes even within the same country, has aroused the interest of researchers. This study is based on contingency theory to support the port governance model. The purpose is to understand the port governance model and the relation with port performance. There are three objectives: to analyze the port governance mechanisms; to analyze the port performance factors; and to understand the influence of the governance model mechanisms on port performance. A factorial analysis was used to determine the main components, and the methodology of the structural equation model was used to analyze a survey sample of 105 valid responses from specialists and managers of port user's companies that operate in the main Portuguese ports. This study demonstrates that port governance model influences directly the port performance. The main contribution of this paper to the literature is providing a set of factors that public managers may decide when changing the characteristics of the port governance models to ensure their performance. It was also observed the approximation of the port expert vision of port governance with models described in literature.

1. Introduction

The diversity of port governance models in the world, on different continents, and sometimes within the same country, with historical and political origins and diverse performances, has aroused the interest of researchers. The increasing importance of maritime transport in the global and local economies and the trends in the port industry towards terminal concessions have led to a redefinition of the port authority's role. The port authority has assumed an increasing entrepreneur role, with greater autonomy—devolution—and enlargement of the focus to the logistics chain and hinterland connectivity—regionalization (Brooks and Pallis 2008, 2012; Brooks, Cullinane, and Pallis 2017; Jia et al. 2017; Wang, Chen, and Huang 2018). The concept of governance involves a full set of relationships between a company's management, its board, its shareholders and other stakeholders. It provides the structure through which the objectives of the company are set, and the means of attaining those objectives and monitoring performance are determined (OECD 1999). Port literature has made important advances in recent years, such as Brooks and Cullinane (2007a), Brooks and Pallis (2008), Verhoeven (2010), Brooks and Pallis (2012), Brooks, Cullinane, and Pallis (2017) and Pilcher and Tseng (2017). Governance models' classification, as well as the description of the reform mechanisms of these models, was advanced

by some authors (Baltazar and Brooks 2001; Brooks and Cullinane 2007b; Brooks and Pallis 2008; Van der Lugt, Langen, and Hagdorn 2015).

However, there is no comprehensive literature on port governance models' decision impacts on performance, since it is a recent, complex and geographically diversified topic.

World Bank (2007) port governance models, for example, did not address the relationship between governance and performance. More recently, Brooks, Cullinane, and Pallis (2017) developed an important advance in the case analysis of diverse countries around the world, focusing on the changes in national port policies with respect to devolution, regulatory reform and newly imposed governance models over the past decade. Previously, Baltazar & Brooks (2006) presented a theoretical approach of the concepts associated to the reform process of the port governance model, including governance, environment, the port model and performance decisions. This model was later developed by Brooks and Pallis (2008) and Brooks and Pallis (2012). However, it would be important to cross the model with the multinational analysis of Brooks, Cullinane, and Pallis (2017) to understand the adherence to this diversity in ports and detail the classification and structure of the different decision options on port governance and their effect on performance.

Port governance is divided into (a) port governance and (b) port authority governance. In the first case, port governance covers the way services and terminals are managed and their relationship with the port (World Bank 2007); in the second case, it refers to port authority's internal governance and its relationship with the government and external agencies (Brooks and Cullinane 2007a; Verhoeven 2014). The port authority is a body with statutory responsibilities that manages a port's water and land-site domain, regardless its ownership and respective nature (De Monie 2004). The literature highlights the importance of competition in each port services segments (De Langen and Pallis 2006). It also shows a greater integration of ports and private terminal operators in the production and supply chains and with the geographical extension of ports action (Notteboom and Rodrigue 2005; Rodrigue and Notteboom 2010). This study is based on contingency theory (Baltazar & Brooks, 2006) to support the port governance model.

The purpose is to understand the port governance model and the relation with the port performance, focusing in three different objectives: first, to analyze the port governance mechanisms; second, to analyze the port performance factors; and third, to understand the influence of the governance model mechanisms on port performance.

A factorial analysis was used to determine its main components, and a methodology with a structural equation model analyzed a sample of 105 valid answers of a survey sent to specialists and managers of port user's companies that operate in the main Portuguese ports.

Portuguese ports are included in the Latin model of governance, based on centralized control and state influence. This model of port governance confronts the liberal model. It has been a contradictory process, with advances and retreats. The government backed by more conservative and liberal political forces advocated greater autonomy, especially during the recent IMF and Troika intervention. The more socialist government advocated greater centralization and the limitation of this autonomy, formally supported by central departments. Also, it is verified that different stakeholders defend the creation of a national holding of ports; other stakeholders advocate the merger of regional ports; and still others, the full autonomy of the ports. Also increased private participation in port management, with larger investments and longer concession periods versus larger state investments and shorter concessions differentiate governance models. However, there seems to be common trends in the different currents of thought and policies towards the adoption of the liberal model, conducive to port regionalization and autonomy, relevant to the research (Caldeirinha, Felício, and da Cunha 2017).

The paper is structured as follows. After the introduction, a theoretical framework is presented, based on contributions to the topic. Section 3 focuses on the integration of the research method with the conceptual model and hypotheses, factors and variables, data collection, sample, and statistical methodology. In Section 4 we present the analysis and results, a discussion of the results is presented in Section 5, followed by the conclusions and contributions.

2. Theoretical contribution

The port governance model evolution, including tendencies like devolution and regionalization policies, has been increasing the port authority's autonomy and responsibility, giving them a wider role beyond the port itself (Verhoeven 2014; Van der Lugt, Langen, and Hagdorn 2015). The port governance model characteristics should ensure efficiency and effectiveness as drivers to the satisfaction of customers and port users, with reduced costs and high-quality services (Brooks, Schellinck, and Pallis 2011; Onut, Tuzkaya, and Torun 2011; Felício, Caldeirinha, and Dionísio 2015).

The literature has pointed to the need to reform governance models to ensure better port performance, especially regarding: (a) the creation of conditions for economic development (Tongzon 2002; Cheon 2007), (b) ensure efficiency through customer satisfaction and differentiated supply chain needs (Brooks, Schellinck, and Pallis 2011) and (c) promote efficient and productive port activity growth (Cheon, Dowall, and Song 2010).

Baltazar & Brooks (2006) resorted to the contingency theory to support the port governance model. Open systems organizations require governance adjustments to meet the balance needs and to adapt to the external environment. Nevertheless, the single solution for governance model does not exist, because it depends on the local goals and environment type. Different governance models are needed in different environments (Lambert 2009).

National laws and specific port legislation have direct influence on the decision process about the port governance model mechanisms in each country and its evolution (Caldeirinha, Felício, and da Cunha 2017; Rodrigue 2017). Portugal legislation of 2006 on corporate governance strengthened supervision and control of port governance (Roque 2015). National policy has an influence on ports and on the decisions regarding the port governance model, as mentioned by Pallis and Vaggelas (2017). In the case of Italy, national policy has a special influence on the model of regionalized port authorities that is being developed, contrary to tendencies of greater local autonomy and devolution (Parola et al. 2017). In the case of the Netherlands and Belgium, despite different national laws for each country, the common municipal political model implies local and autonomous governance systems (Van de Voorde and Verhoeven 2017; De Langen and Van de Lugt 2017; Van der Lugt, Langen, and Hagdorn 2015). Port policy has thus a special impact on policy choices and decisions in all countries. In Netherlands, the port-oriented business policy, with environmental concerns, has led to the development of a model of port authority as a port development company (PDC), which prospects and invests in new business niches (De Langen and Van de Lugt 2017; Van der Lugt, Langen, and Hagdorn 2015).

Global technical and economic changes have been determining the characteristics and decisions about the port governance model, as is the case of China, where the deceleration of economic growth and the recent strategy of the new silk route (OBOR—One Belt, One Road) using large ships has determined a model of cooperation between port authorities in a context of flexible management geared towards large investments, quality of service and global expansion (Notteboom and Yang 2017). Local economic conditions also influence the port governance model, as has already been the case in Portugal and Greece port governance model mechanisms (Caldeirinha, Felício, and da Cunha 2017).

Cities and regions contexts determine port governance, as in the case of Belgium and the Netherlands, or the case of the new governance model in Italy. In Spain, the autonomous regions have a strong influence on the management model of each port, but this is also conditioned by instruments created by Madrid to control the management in a centralized way through the government agency Puertos del Estado (Laxe, Sánchez, and Garcia-Alonso 2017).

Private actors in ports also determine port governance model choices. The French ports have strong local proximity with the port users and in the Turkish ports, private companies own land inside ports jurisdiction areas conditioning their management (Debrie, Lacoste, and Magnan 2017; Esmer and Duru 2017). In British and Australian ports, private companies influence the private-based governance model of ports (Monios 2017; Chen, Pateman, and Sakalayen 2017).

The size of the market also plays a role in the port governance model, such as island ports like Cyprus, where issues of local demand dimension involve port authorities oriented towards international transshipment opportunities in Limassol (Panayides, Lambertides, and Andreou 2017). The size of the port determines the governance model, as can be seen in Canada and France, where ports are divided into different governance models, more national or local, according to their respective size (Brooks 2017; Debrie, Lacoste, and Magnan 2017). McCalla (2008) focused his analysis on site and situation geographical factors in the case of Kingston (Jamaica), highlighting the importance of the port's relative location in the transshipment activity.

2.1. *Port governance models and performance*

Decisions about the port governance model can be made by several stakeholders under the influence of external environmental factors.

The complexity and diversity of models does not allow us to analyze the totality of the characteristics of each one. But it is possible to find variables that allow to differentiate tendencies in port reform processes and the application of classic models in diverse regions of the world.

For example, in Europe governance models are subdivided into the Hanseatic, with local governance, Latin type, with a more central governance, and Anglo-Saxon, with independent governance private type (Suykens and Van de Voorde 1998), but in the rest of the world there are many other models and subtypes. And even these models mix decisions of different types depending on the country in concrete and the moment of time. There are also different governance practices between small and large ports.

One of the main variables of port governance is associated to the type of port authority, its main functions and relationship with port operators. In this case, ports are traditionally divided into (a) service port, (b) tool port (c) landlord port and (d) full privatized port (World Bank 2007). Most ports have adopted landlord strategies, although some ports in the Caribbean, especially in smaller islands, and the Macaronesia (the archipelagos of Azores or Cape Verde, for example) or South Africa have adopted the Service port model (Havenga, Simpson, and Goedhals-Gerber 2017; Cubas, Briceno-Garmendia, and Bofinger 2015). The Tool port model still prevails in some particular cases like in the case of the island of Madeira or the port of Aveiro, in Portugal. However, in many countries there is a mix of these models, as in the case of Brazil, where some private terminals have recently been created under the supervision of the Federal authorities (Galvao, Robles, and Guerise 2017). In South Korea, the Central Government operates ports directly, but is looking for the introduction of a more entrepreneurial mindset (Song & Lee, 2017). Most countries do not intend to privatize port authorities, adopting a landlord model with private operators with concessions of 30 years or more (De Langen and Van de Lugt 2017; Van der Lugt, Langen, and Hagdorn 2015).

In turn, there are port authorities fully privatized as in New Zeeland port (Bandara and Nguyen 2015; Tull and Reveley 2001) or by grant of a concession by government, such as Piraeus or new autonomous port authorities, such as the ones of the ports of Turkey and China (Notteboom and Yang 2017; Esmer and Duru 2017). There are port authorities that depends on local cities or regional, national or federal central decisions. In Brazil, the power was recently concentrated in a national authority, ANTAQ (Galvao, Robles, and Guerise 2017). Government plays an important role in defining and achieving strategic and socio-economic policy objectives, underlying its ownership of the port authority (De Langen and Van de Lugt 2017; Van der Lugt, Langen, and Hagdorn 2015).

The port authorities focus varies considerably. It may be concentrated in its core port business, it may be in local relations, with port community and the municipality, or it may be on a more regional level within the logistics platforms and supply chains in the hinterland (regionalization), which is considered a new phase of port's life (Notteboom and Rodrigue 2005). According to Villa (2017), Mexican ports are now looking to widen their focus on hinterland logistics. Rodrigue and

Notteboom (2010) report that the regionalization phase brings the perspective of port development to a higher geographical scale, which is beyond the port perimeter.

The relations between nearby ports and its port authorities are discussed and includes integration or cooperation strategies, such as China (Notteboom and Yang 2017) and coopetition or competition, as in the case of the Belgian or Dutch ports. Many regional ports integrate small ports and there is a discussion about possible integration of large ports located in the same region, with the government requiring greater cooperation between port authorities. Management coordination between ports, while maintaining their respective autonomy, is another possible perspective (Notteboom and Rodrigue 2005). Knatz (2017) refers to the case of cooperation between US ports in logistics chain to combat the threat of the Panama Canal. Notteboom (2009) report that cooperation between competing ports (typically in proximity) is often seen to avoid inter-port destructive competition. Port Authorities strive to minimize competitive environment using flexible governance framework within ports.

The organization of ports varies from country to country, varying from more centralized models of a single national port authority, such as South Africa, Cyprus or Taiwan, where four authorities were concentrated in a single national (Tseng and Pilcher 2017; Havenga, Simpson, and Goedhals-Gerber 2017) to regional or multi-port authorities, as is being developed in Italy and as is the case of West Australian ports. Some local authorities are differentiated by size of port, between small and large ports, as is the case in Canada. However, sometimes there are several models within the same country (Havenga, Simpson, and Goedhals-Gerber 2017; Brooks 2017; Parola et al. 2017; Panayides, Lambertides, and Andreou 2017).

The port authority functions may be distinguished from (a) conservative operator, (b) simple land manager and facilitator, and (c) PDCs new activities (Van der Lugt, Langen, and Hagdorn 2015). The conservative port authority focuses on managing and implementing actions passively and mechanistically. The 'facilitating' port authority assumes itself as mediator and partner between economic and social interests, seeking to become involved in strategic regional partnerships. The 'business' port authority combines features of facilitator with the attitude of an investor, service provider and consultant (Verhoeven 2010; Verhoeven and Vanoutrive 2012).

The intra-port competition regulation is an important characteristic of the port governance model and can be more oriented to (a) liberalization of port services; (b) limitation of port service providers; or (c) to monopoly on port services (World Bank 2007).

The port managers' selection process is an important factor and can influence port performance. The managers can be appointed by national politicians, local politicians, recurring to a technical tender or appointed by the port community (MARE 2014). When port managers, or other port positions, are chosen on friendship basis or political closeness, good results cannot be expected and over staffing can influence performance.

It is possible to distinguish the type of Management Control exercised over the port authority: (a) internal control, (b) financial and investment control, government control, (c) management KPIs, monitored monthly or quarterly by government, and (d) Total control and decision dependence of the central government or another entity (Roque 2015). De Langen and Van de Lugt (2017) mention that governments create control mechanisms that reduce ports independence, but they should instead create autonomous bodies of supervision.

2.2. Main model types

Taking the variables found in the literature, it was possible to identify several main governance models divided between the Private, Liberal, Controlled and Centralist models (Table 1).

The private model (based on the Anglo-Saxon model) consists of private port authority and private operator with autonomy and minimal contractual control by the government. The core of the activity is focused on port operations and its influence can be extended to the railroad or to logistics areas in the hinterland. This model is based on competition between ports and on

Table 1. Classification of the main models of port governance.

Main port governance models characteristics	Private	Liberal	Controlled	Centralist
PA type	Full private port	Landlord	Landlord	Tool/Service port
PA power	Private power	Devolution/ Autonomy	Controlled devolution	Centralist
PA focus	Core	Regional/ International	Regional	Core
PA's relations	Competition	Coopetition	Cooperation	Integration
PA geo-organization	Each port PA	Each port PA	PA regional fusion	One PA
PA functions	Land manager	Development	Facilitator	Operator
PA competition model	Liberalization	Liberalization	Limitation	Monopoly
PA managers selection	Technical	Mix	Political	Political
PA management/Legal structure control type	Minimal	Internal control	Finance and invest	Total control
PA nature	Full private	Government company	Government company	Government department
PA financing	Pay to government	Balanced accounts	Government add	Public money

Source: Adapted from Baltazer & Brook (2006), Brooks and Cullinane (2007a), Bandara, Nguyen, and Chen (2013).

liberalizing of services. The managers are selected by merit. Sometimes under this model, a fee is due to the government in return for the port concession or for buying the land (Brooks and Cullinane 2007a).

The liberal and local model (based on the Hanseatic model) consists of a public port business authority and private concessionaires or leasers, with considerable autonomy (devolution) and control of KPIs and internal financial by a company supervisory body. It is focused on regionalization and international relations and in the international hinterland and foreland. Competition and cooperation with other neighboring and distant ports is a driving force. It is a development port company, liberalizing services as much as possible. Management is ensured by technicians selected by merit, but also by political choice. It is required that these port authorities have the balanced budgets (Brooks and Cullinane 2007a).

The Controlled model (based on Latin model) relies on a public capital port authority and fully private concessionaire terminal operators of public service, with some autonomy (controlled devolution) and financial and investments strategy controlled by the government. The focus is on regionalization, widening its influence in the near hinterland. Cooperation with other neighboring national ports is stimulated by the government. It aims to be a business facilitator, limiting the number of service providers as much as possible to ensure scale and control. It is managed by technicians selected by political choice. It often receives government aids for certain major public investments (Brooks and Cullinane 2007a).

The centralized model relies on a port authority that works as government agency that controls all or some ports of the country, with tight financial, economic, operational and investment or strategy control. The ports under this regime are focused on the core of the port operation, with an integrated view of the neighboring ports and sometimes of the railroad. It is a port activity operator, with a monopoly status. It is managed by technicians selected by political choice and depends on the government budget, although it can have its own limited budget (Havenga, Simpson, and Goedhals-Gerber 2017).

2.3. *Expected results*

Port government decisions are related to maximization of impact on performance, as Brooks and Pallis (2008) mention, and the performance of the economy. But we must be careful to be rigorous in the measure of this impact as referrer by Pilcher and Tseng (2017). The main variables used by the authors in the evaluation of the results of the port governance model reforms include port

throughput, measured by the total movement of goods or the number of containers or TEU (20 equivalent unit) moved by the port (World Bank 2007).

Other objectives include the containment or reduction of costs and prices charged by ports to final customers, by increasing competition and operational efficiency among operators. In the case of the port of Gothenburg, the port terminal concession process involved strikes, throughput reduction and customer dissatisfaction, as well as rising prices, which was contrary to the objectives of the port reform, allegedly due to lack of competition (Bergqvist and Cullinane 2017). Also, in Australia, port reforms have led to unexpected results with rising costs and port prices, as well as reduced investment due to lack of competition and lack of public interest advocacy, due to port privatization, contrary to expectations with the reform (Chen, Pateman, and Sakalayen 2017; Bandara, Nguyen, and Chen 2013). In Italy, the political instability and its effects on a port governance without adequate autonomy and stability is cited as the cause of reduced investment. Privatization of ports in the United Kingdom is also seen as a cause of lack of investment in infrastructure and equipment and low productivity (Monios 2017). Recently, Chile has increased its productivity with a port privatization policy (Wilmsmeier and Sánchez 2017).

Positive or balanced financial results are common goals in many countries when deciding on governance models. The effectiveness, the customer satisfaction and supply chains are important objectives, but little considered in port governance decisions (Vieira et al. 2014).

3. Research method

3.1. *Conceptual model and hypotheses*

The purpose is to understand the port governance model and the relation with port performance. The research model evaluates port governance model mechanisms and its relationship with the port performance factors (Figure 1).

The hypotheses proposed are those following:

H1—Mechanisms that characterize the port governance model are PA autonomy, PA public owned, PA operation focus, regional port fusion, community in PA management, private operation, and port focus enlargement.
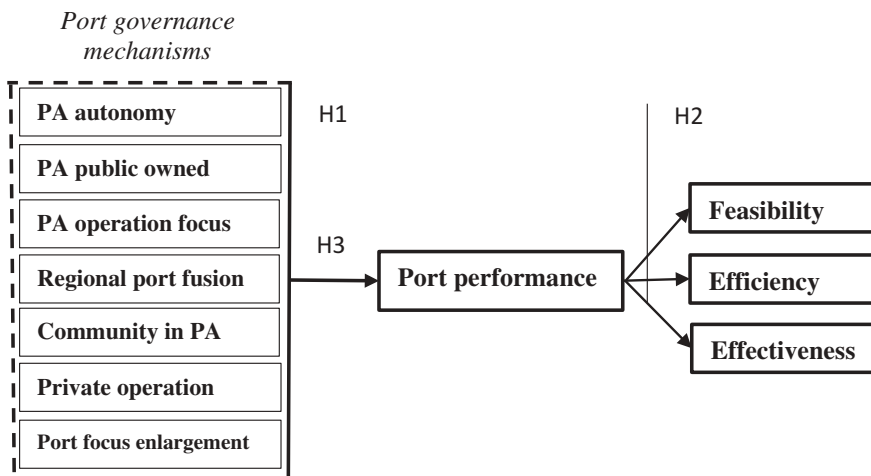

Figure 1. Conceptual model.

H2—Mechanisms that characterize the port performance are feasibility, efficiency and effectiveness.

H3—Port governance mechanisms influence port performance.

3.2. *Factors and variables*

Port governance model mechanisms consists of the main constructs and variables that characterizes the differences between world port governance models, identified in literature review and resulted from factorial analysis to survey variables (Table 2). Port governance model mechanisms consists of the PA autonomy that includes clear strategy, strategy accepted by all port, no conservative PA, entrepreneur PA, PA internal control, cooperation focus, business PA, PA balanced accounts, autonomous PA; PA public owned that includes Government company, public owned, Government PA and Government control of port; PA operations focus that includes PA operator, operation focus, and Government approved prices; Regional port fusion that includes neighborhood PA joint management, port fusion, and national PA; Community in PA management that includes Region in PA management, port community in PA management, PA depends from Region, and small ports city management; Private operation that includes operation by private companies and concession of operations; and port focus enlargement that includes PA pays dividends to Government, main role of PA in logistics chain, and PA internationalization. Port performance factors consists of feasibility, efficiency and effectiveness as direct observed variables.

3.3. *Data collection, sample and measurement*

The main evolution characteristics and contradictions of the governance model of Portuguese ports, linked to two different political periods, were showed by Caldeirinha, Felício, and da Cunha (2017) and referred in literature review. It was considered important to understand now which is the most suitable model for good port performance in the future would be, independent from political choices and evaluate if follows the global tendency for liberal model. Qualitative data was collected based on a survey sent to the main Portugal port users. A question was addressed to each of the 44 variables based on literature, concerning the port governance model characteristics (40 variables) and port performance measures (4 variables), using a 7-point Likert scale (Appendix 1). The questionnaire was submitted online in November 2017 to 955 managers from companies operating in the five main of Portuguese ports, with 105 valid answers.

After the data collection, a factorial analysis was performed to operationalize the model, and a set of eight main factors with Cronbach's Alpha greater than 0.6, corresponding to 31 variables was selected (Table 2). One of the factors is port performance with three variables. The remaining seven factors are related to the characteristics of governance models and include 28 variables of the 44 initial variables, 13 were rejected due to lack of model statistical significance, although the hierarchy of classification by the respondents is important (Appendix 1).

The sample characterization expresses the typology of the respondent's company and the port that he knows best (Tables 3 and 4).

3.4. *Statistical methodology*

The factorial analysis methodology allowed the definition of the main components of the model. SPSS25/AMOS25 software was used to perform the calculations. It was also used the integrated methodology of structural equations modeling to evaluate the general research model and the latent/observed explanatory and explained variables.

Table 2. Constructs and variables.

Construct	Variable	SEM β	Alpha Cronbach	Authors
Port performance	Feasibility	0.51		Bergqvist and Cullinane 2017;Monios
	Efficiency	0.75	0.825	2017, Wilmsmeier and Sánchez 2017;
	Effectiveness	0.88		Brooks, Schellinck, and Pallis 2011; World Bank 2007; Brooks and Pallis 2008; Vieira et al. 2014; Sanz-Blas, Carvajal-Trujillo, and Buzova 2017
PA Autonomy and Entrepreneurship	Clear strategy	0.66		
	Strategy accepted by all port	0.55		
	No conservative PA	0.49		Van de Voorde and Verhoeven 2017; De Langen and Van de Lugt 2017; Van der Lugt, Langen, and Hagdorn 2015; Verhoeven 2010; Verhoeven and Vanoutrive 2012; Van der Lugt, Langen, and Hagdorn 2015
	Entrepreneur PA	0.73		
	PA Internal control	0.53	0.804	
	Cooperation Focus	0.61		
	Business PA	0.66		
	PA Balanced accounts	0.47		
	Autonomous PA	0.59		
PA Public Owned	Government company	0.50		
	Public owned	0.77	0.677	Roque 2015; Van de Voorde and Verhoeven 2017; De Langen and Van de Lugt 2017
	Government PA	0.78		
	Government Control	0.75		
PA Operation Focus	PA Operator	0.55		
	Operation Focus	0.46	0.634	World Bank 2007; Havenga, Simpson, and Goedhals-Gerber 2017, De Langen and Van de Lugt 2017
	Government approves prices	0.58		
Regional port Fusion	Neighborhood PA joint management	0.68		Havenga, Simpson, and Goedhals-Gerber 2017; Brooks 2017; Parola et al. 2017, Panayides, Lambertides, and Andreou 2017; Tseng and Pilcher 2017
	Port fusion	0.68	0.691	
	National PA	0.52		
Community in PA Management	Region in PA management	0.64		
	Port community in PA management	0.56		Havenga, Simpson, and Goedhals-Gerber 2017; Panayides, Lambertides, and Andreou 2017; Tseng and Pilcher 2017
	PA depends from region	0.58	0.671	
	Small ports city management	0.47		
Private Operation	Operation by private companies	0.59	0.645	World Bank 2007; Havenga, Simpson, and Goedhals-Gerber 2017, De Langen and Van de Lugt 2017; Yu et al. 2017
	Concession of operation	0.57		
Port focus enlargement	PA pays dividends to Government	0.67		
	Main role of PA in logistics chain	0.47	0.654	Notteboom and Rodrigue 2005; Wang, Chen, and Huang 2018
	PA internationalization	0.70		

The measurement model allowed to evaluate the goodness-of-fit of the model adjustment and of the latent variables, based on the observed variables. That was followed by the development of the structural model with the various causal relations between the variables, measuring of the adjustment coefficients. This methodology allowed to evaluate the general adjustment of the model among the variables.

4. Analysis and results

After the development of the structural model, the necessary internal adjustments were made to achieve a high level of goodness-of-fit. Thus the general internal consistency of the model was verified, as well as the convergence validity of latent variables and the model unidimensionality using the Cronbach's alpha coefficient as defined by Hair et al. (1998). Significant results were obtained confirming the goodness-of-fit of the model (χ^2: 1300.2/χ^2/df: 3.01/RMSEA: 0.098 < 0.1).

Table 3. Typology of the respondent's company.

	Frequency	Percent
Ship agent	8	7.6
Ship owner	5	4.8
Port authority	37	35.2
Shipper	4	3.8
Logistics company	1	1.0
Terminal operator	13	12.4
Freight forwarder	3	2.9
Other	34	32.5
Total	105	100.0

Table 4. Respondent's port.

	Frequency	Percent
Aveiro	3	2.9
Leixões	14	13.3
Lisboa	23	21.9
Setúbal	37	35.2
Sines	28	26.7
Total	105	100.0

The model result (Figure 2) explains port performance ($R^2 = 0.42$), including feasibility ($R^2 = 0.26$), efficiency ($R^2 = 0.56$) and effectiveness ($R^2 = 0.77$). The governance model main characteristics that explain port performance are Private operation ($\beta = 0.95$), PA Autonomy ($\beta = 0.24$), PA public owned ($\beta = 0.22$) and Region and Port Community in PA management ($\beta = 0.18$). Factors with a negative impact on port performance are Regional Port Fusion ($\beta = -0.15$), Enlargement of Port Focus ($\beta = -0.15$) and PA operation focus ($\beta = -0.07$).

5. Discussion

The observed variables mean, resulting from the survey and used in constructs, assume values higher than 3,5 points (7-Likert scale), confirming it importance. The factorial results confirm the main constructs used in model. These results confirm H1.

The results show that port efficiency based on investment and productivity, with effect on prices, is ideally an important characteristic for port specialists, as referred by Bergqvist and Cullinane (2017) and Chen, Pateman, and Sakalayen (2017). It is proved that the ports' profitability/feasibility, with
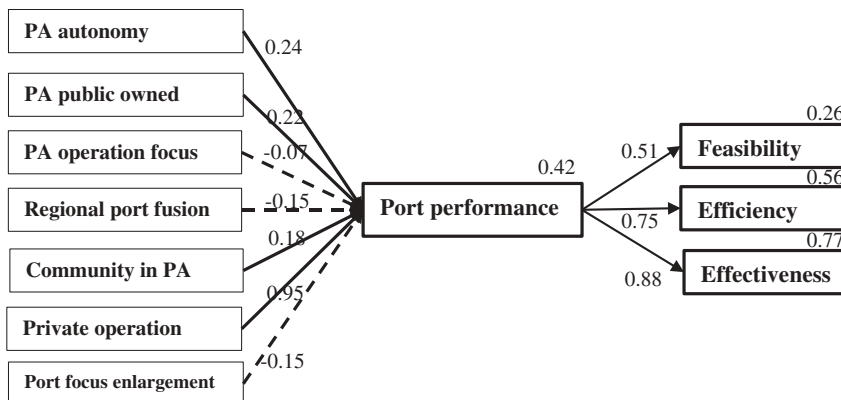

Figure 2. Results of the structural model.

positive or balanced results, is an important performance, and that effectiveness variable and custo-mers/supply chains satisfaction are important performance indicators considered by the experts, as reported by Vieira et al. (2014). In consequence, these results confirm H2.

In this survey, port experts consider it is important for port performance to adopt the Landlord port model, with the concession of port operations to private companies and the reduction of the port authority's direct port operation. There are evidences in results to reject that the full privatized port model has positive results in the performance, preferring a public owned port authority (Appendix 1). This classification was adopted by World Bank (2007). This confirms tendency at most world's ports, with the adoption of landlord model (De Langen and Van de Lugt 2017; Van der Lugt, Langen, and Hagdorn 2015). They do not consider that the government should operate the port directly but consider that publicly owned port authorities should increase the characteristics of an entrepreneurial mindset, as referred to by Song & Lee (2017). The results point out that the government plays an important role in defining and achieving port policy goals, since it owns the port authority, although more control must be carried out by internal bodies as advocated by De Langen and Van de Lugt (2017). The results also point out that the port authorities should not focus only on their core business, but must give more attention to local customers, logistics chains and to their region/city, that should participate on the port's manage-ment (minimized regionalization), corroborating only partially what Notteboom and Rodrigue (2005) or Villa (2017) have referred. The results highlight the need of closer relations between nearby port authorities, a topic that is discussed in literature with integration and cooperation strategies (Notteboom and Yang 2017). The results point out to a negative effect on performance of the integration/fusion of large ports located in the same region, preferring the cooperation between ports as referred by Knatz (2017) or Notteboom (2009), including co-opetition between ports in proximity. The results reveal the existence of performance advantages for ports whose port authorities have a clear and consensual strategies and that are more entrepreneurial and operate as PDCs, as defended by Van der Lugt, Langen, and Hagdorn (2015), rejecting the conservative port authority that is mainly focused on managing the port only as landlord. Although the model did not include variables about selection of port managers, the means reached by the respective variables point to the preference for merit-based selection process as an important factor that can influence port performance, as mentioned. In conclusion, these results confirm H3.

It can be also observed that the optimum port governance model for Portuguese experts approaches the characteristics of the liberal governance model, as described in the literature review (Table 5). Portuguese government should take this result in consideration in the new port political plans and avoid measures that collide with this long-term tendency, but this results also express the global tendency about ideal port governance model and may be extended to other geographies, with appropriate adaptations.

The port governance model with performance impact is characterized by being a Landlord model, with the operation being granted to private companies and an entrepreneurial port authority, autonomous from the government or from other ports. The port should be owned by the government, being the management board controlled by an internal body with participation of the region or city and the involvement of the Port Community. The results suggest that the merger of ports and the focus on operation by the port authority have negative impact in performance, and the port authority should be concerned on the region and logistics issues but avoiding becoming a full logistics operator.

On the other hand, the characteristics of port governance models with the highest score (Appendix 1) include the concession of the operation to private hands, the autonomy of each port in relation to the government or other ports. Additionally, the port authority should have capacity to negotiate prices, and to cooperate, having balanced accounts, and managers appointed by merit, clear strategies accepted by the port community, and an entrepreneurial and facilitator port authority, with internal supervision and control.

Table 5. Liberal model and optimum model for Portuguese experts.

Main port governance models characteristics	Liberal	Optimum model for Portuguese experts
PA type	Landlord	Landlord and concession of operation to private
PA power	Devolution	Devolution with more autonomy to port
PA Focus	Regional	Focus on regionalization without operation of rail and logistics
PA's relations	Coopetition	Cooperation without integration of ports
PA geo-organization	PA Autonomy	PA Autonomy of each port without fusion
PA functions	Development	Entrepreneurship and Development Cia.
PA competition model	Liberalization	Liberalization with external regulator
PA managers selection	Mix	Technical and merit
PA management control	Internal control	Internal control
PA nature	Government company	Government company
PA financing	Own receipts	Own receipts and balance accounting

6. Conclusions and contributions

The research confirms existence of port governance model mechanisms and its relationship with higher levels of performance, feasibility, profit, efficiency and effectiveness, and consequently economic impact, aiming port authorities and port operators to increase their results. The mechanisms that characterize the port governance model are: PA autonomy, PA public owned, PA operation focus, regional port fusion, community in PA management, private operation, port focus enlargement. The mechanisms that characterize the port performance are: feasibility, efficiency and effectiveness. Port governance model mechanisms influence port performance.

The main governance characteristic is private port operations, through concession, although land ownership and port management should be kept public and not privatized. The port authority should abandon definitively port operations, and make an approach to the logistics chain, but avoiding a direct participation in the land transport or logistics areas management.

Another important characteristic is the port authority's business mindset and its autonomy from the government, with freedom to take business actions and create new businesses that are necessary for the port development, as a true PDC. The port authority control should be through an internal organization of the port itself and not by government supervision, either by the ports ministry or by the finance ministry. The model explains port performance, including profitability, efficiency and effectiveness.

Another important conclusion is the approximation of the of port governance with the liberal model, described by the authors based on the Hanseatic model, which reveals the importance of the success of this model in Northern Europe, as well as worldwide.

The main contribution of this paper to the literature is providing a set of factors that public managers may decide when changing the characteristics of the port governance models to ensure their performance

The conclusions should consider the sample's number of observations limitations and the geographical limitations, so it would be interesting to extend the study to other countries and continents, with different port governance models to confirm these results Another important issue will be the inclusion of environmental effect and local factors that may affect the model.

Disclosure statement

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References

Baltazar, R., and M. R. Brooks. 2001. "The Devolution of Port Management: A Tale of Two Countries." Paper presented at the world conference on transport research, Seoul.

Baltazar, R., and M. R. Brooks. 2006. "Port Governance, Devolution and the Matching Framework: A Configuration Theory Approach." *Research in Transportation Economics* 17 (1): 379–403. doi:10.1016/S0739-8859(06)17017-1.

Bandara, Y. M., and H.-O. Nguyen. 2015. "Port Infrastructure Pricing Policy and Practice: A Case Study of Australia and New Zealand Seaports." *Australian Journal of Maritime & Ocean Affairs* 1–22. doi:10.1080/18366503.2015.1031861.

Bandara, Y. M., H.-O. Nguyen, and S.-L. Chen. 2013. "Determinants of Port Infrastructure Pricing." *The Asian Journal of Shipping and Logistics* 29 (2): 187–206. doi:10.1016/j.ajsl.2013.08.004.

Bergqvist, R., and K. P. Cullinane. 2017. "Port Privatisation in Sweden: Domestic Realism in the Face of Global Hype." *Research in Transportation Business & Management* 22: 224–231. doi:10.1016/j.rtbm.2016.10.007.

Brooks, M. 2017. "A New Direction or Stay the Course? Canada's Port-Specific Challenges Resulting from the Port Reform Program of the 1990s." *Research in Transportation Business & Management* 22: 161–170. doi:10.1016/j.rtbm.2016.08.002.

Brooks, M., K. Cullinane, and A. A. Pallis. 2017. "Revisiting Port Governance and Port Reform: A Multi-Country Examination." *Research in Transportation Business & Management* 22: 1–10. doi:10.1016/j.rtbm.2017.02.005.

Brooks, M. R., and A. A. Pallis. 2012. "Port Governance." In *Maritime Economics*, edited by W. T. Talley, 491–516. Chichester: Blackwell Publishing.

Brooks, M. R., and A. A. Pallis. 2008. "Assessing Port Governance Models: Process and Performance Components." *Maritime Policy & Management* 35 (4): 411–432. doi:10.1080/03088830802215060.

Brooks, M. R., and K. P. Cullinane. 2007a. *Devolution, Port Governance and Port Performance (Research in Transport Economics, 17)*. Oxford: Elsevier.

Brooks, M. R., and K. P. Cullinane. 2007b. "Conclusions and Research Agenda." *Research in Transportation Economics* 17: 631–660. doi:10.1016/S0739-8859(06)17026-2.

Brooks, M. R., T. Schellinck, and A. A. Pallis. 2011. "A Systematic Approach of Evaluating Port Effectiveness." *Maritime Policy & Management* 38 (3): 315–334. doi:10.1080/03088839.2011.572702.

Caldeirinha, V., J. A. Felício, and S. F. da Cunha. 2017. "Government Policies and Portuguese Port Governance in the Period from 2005 to 2015." *Research in Transportation Business & Management* 22: 11–20. doi:10.1016/j.rtbm.2016.11.004.

Chen, P. S. L., H. Pateman, and Q. Sakalayen. 2017. "The Latest Trend in Australian Port Privatisation: Drivers, Processes and Impacts." *Research in Transportation Business & Management* 22: 201–213. doi:10.1016/j.rtbm.2016.10.005.

Cheon, S. 2007. *Evaluating Impacts of Institutional Reforms on Port Efficiency Changes Malquimist Productivity Index for World Container Ports*. Post-Doctoral research. Berkeley: University of California.

Cheon, S. H., D. E. Dowall, and D. W. Song. 2010. "Evaluating Impacts of Institutional Reforms on Port Efficiency Changes: Ownership, Corporate Structure, and Total Factor Productivity Changes of World Container Ports." *Transportation Research Part E: Logistics and Transportation Review* 46 (4): 546–561. doi:10.1016/j.tre.2009.04.001.

Cubas, D., C. Briceno-Garmendia, and H. Bofinger. 2015. "OECS Ports: An Efficiency and Performance Assessment." Policy Research Paper 7162. World Bank.

De Langen, P., and L. Van de Lugt. 2017. "Institutional Reforms of Port Authorities in the Netherlands; The Establishment of Port Development Companies." *Research in Transportation Business & Management* 22: 108–113. doi:10.1016/j.rtbm.2016.12.007.

De Langen, P. W., and A. A. Pallis. 2006. "Analysis of the Benefits of Intra-Port Competition." *International Journal of Transport Economics* 33 (1): 69–86.

De Monie, G. 2004. "Mission and Role of Port Authorities after Privatization." Paper presented at the ITMMA PPP seminar, Antwerp, Belgium: November.

Debrie, J., R. Lacoste, and M. Magnan. 2017. "From National Reforms to Local Compromises: The Evolution of France's Model for Port Management, 2004–2015." *Research in Transportation Business & Management* 22: 114–122. doi:10.1016/j.rtbm.2016.12.006.

Esmer, S., and O. Duru. 2017. "Port Governance in Turkey: The Age of the Global Terminal Operators." *Research in Transportation Business & Management* 22: 214–223. doi:10.1016/j.rtbm.2016.12.001.

Felício, J. A., V. Caldeirinha, and A. Dionísio. 2015. "The Effect of Port and Container Terminal Characteristics on Terminal Performance." *Maritime Economics & Logistics* 17: 493–514. doi:10.1057/mel.2014.33.

Galvao, C. B., L. T. Robles, and L. C. Guerise. 2017. "20 Years of Port Reform in Brazil: Insights into the Reform Process." *Research in Transportation Business & Management* 22: 153–160. doi:10.1016/j.rtbm.2017.01.002.

Hair, J., R. Anderson, R. Tatham, and W. Black. 1998. "Multivariate Data Analysis" 5th ed. London: Prentice Hall International

Havenga, J., Z. Simpson, and L. Goedhals-Gerber. 2017. "International Trade Logistics Costs in South Africa: Informing the Port Reform Agenda." *Research in Transportation Business & Management* 22: 263–275. doi:10.1016/j.rtbm.2016.08.006.

Jia, H., L. Daae, V. Solteszova, and S. Strandenes. 2017. "Norwegian Port Connectivity and Its Policy Implications." *Maritime Policy & Management* 44 (8). doi:10.1080/03088839.2017.1366080.

Knatz, G. 2017. "How Competition Is Driving Change in Port Governance, Strategic Decision-Making and Government Policy in the United Governments." *Research in Transportation Business & Management* 22: 67–77. doi:10.1016/j.rtbm.2016.08.003.

Lambert, M. 2009. "A Review of Images of Organization." *International Journal of Complexity & Education* 6 (2): 156–158.

Laxe, F., R. Sánchez, and L. Garcia-Alonso. 2017. "The Adaptation Process in Port Governance: The Case of the Latin Countries in South America and Europe." *Journal of Shipping and Trade* 1 (14). doi:10.1186/s41072-016-0018-y.

MARE. 2014. *Innovations in Public Managers' Selection Systems in EU Member Governments*. Athens: Hellenic Republic.

McCalla, R. 2008. "Container Transhipment at Kingston, Jamaica." *Journal of Transport Geography* 16 (3): 182–190. doi:10.1016/j.jtrangeo.2007.05.006.

Monios, J. 2017. "Port Governance in the UK: Planning without Policy." *Research in Transportation Business & Management* 22: 78–88. doi:10.1016/j.rtbm.2016.10.006.

Notteboom, T. 2009. "Path Dependency and Contingency in the Development of Multi-Port Gateway Regions and Multi-Port Hub Regions." In *Ports in Proximity: Competition and Coordination among Adjacent Seaports*, edited by T. Notteboom, C. Ducruet, and P. De Langen, 55–74. Aldershot: Ashgate.

Notteboom, T., and J.-P. Rodrigue. 2005. "Port Regionalization: Towards a New Phase in Port Development." *Maritime Policy & Management* 32 (3): 297–313. doi:10.1080/03088830500139885.

Notteboom, T., and Z. Yang. 2017. "Port Governance in China since 2004: Institutional Layering and the Growing Impact of Broader Policies." *Research in Transportation Business & Management* 22: 184–200. doi:10.1016/j.rtbm.2016.09.002.

OECD. 1999. "OECD Principles of Corporate Governance." Ad-hoc taskforce on corporate governance. SJG/CG, 5 April. Paris.

Onut, S., U. Tuzkaya, and E. Torun. 2011. "Selecting Container Port via A Fuzzy ANP-based Approach: A Case Study in the Marmara Region, Turkey." *Transport Policy* 18: 182–193. doi:10.1016/j.tranpol.2010.08.001.

Pallis, A. A., and G. K. Vaggelas. 2017. "A Greek Prototype of Port Governance." *Research in Transportation Business & Management* 22: 49–57. doi:10.1016/j.rtbm.2016.12.003.

Panayides, P. M., N. Lambertides, and C. Andreou. 2017. "Reforming Public Port Authorities through Multiple Concession Agreements: The Case of Cyprus." *Research in Transportation Business & Management* 22: 58–66. doi:10.1016/j.rtbm.2016.10.002.

Parola, F., C. Ferrari, A. Tei, G. Satta, and E. Musso. 2017. "Dealing with Multi-Scalar Embeddedness and Institutional Divergence: Evidence from the Renovation of Italian Port Governance." *Research in Transportation Business & Management* 22: 89–94. doi:10.1016/j.rtbm.2016.12.005.

Pilcher, N., and P. Tseng. 2017. "Can We Really Measure the Impact of Port Governance Reform?" *Maritime Policy & Management* 44 (8): 981–994. doi:10.1080/03088839.2017.1380318.

Rodrigue, J. P. 2017. "The Governance of Intermediacy: The Insertion of Panama in the Global Liner Shipping Network." *Research in Transportation Business & Management* 22: 21–26. doi:10.1016/j.rtbm.2016.11.005.

Rodrigue, J. P., and T. Notteboom. 2010. "Foreland-Based Regionalization: Integrating Intermediate Hubs with Port Hinterlands." *Research in Transportation Economics* 27: 19–29. doi:10.1016/j.retrec.2009.12.004.

Roque, L. 2015. *A Influência Do Modelo De Governação Das Autoridades Portuárias No Desempenho*. Porto: Edições Riscos.

Sanz-Blas, S., E. Carvajal-Trujillo, and D. Buzova. 2017. "Assessing Cruise Port of Call Performance: A Passenger-Based Approach Using PLS Modelling." *Maritime Policy & Management* 44 (8): 967–980. doi:10.1080/03088839.2017.1371346.

Song, D. W., and S. W. Lee. 2017. ""Port Governance in Korea: Revisited." *Research Intransportation. Business & Management* 22: 27–37.

Suykens, F., and E. Van de Voorde. 1998. "A Quarter of A Century of Port Management in Europe: Objectives and Tools." *Maritime Policy & Management* 25 (3): 251–261. doi:10.1080/03088839800000037.

Tongzon, J. 2002. "Port Choice Determinants in a Competitive Environment." Paper presented at IAME Conference, Panama.

Tseng, P. H., and N. Pilcher. 2017. "Port Governance in Taiwan: How Hypocrisy Helps Meet Aspirations of Change." *Research in Transportation Business & Management* 22: 38–48. doi:10.1016/j.rtbm.2016.07.003.

Tull, M., and J. Reveley. 2001. "The Merits of Public versus Private Ownership: A Comparative Study of Australian and New Zealand Seaports." *Economic Papers: A Journal of Applied Economics and Policy* 20 (3): 75–99. doi:10.1111/j.1759-3441.2001.tb00984.x.

Van De Voorde, E., and P. Verhoeven. 2017. "Port Governance and Policy Changes in Belgium 2006–2017: A Comprehensive Assessment of Process and Impact." *Research in Transportation Business & Management* 22: 123–134. doi:10.1016/j.rtbm.2016.12.004.

Van der Lugt, L., P. D. Langen, and L. Hagdorn. 2015. "Beyond the Landlord: Worldwide Empirical Analysis of Port Authority Strategies." *International Journal of Shipping and Transport Logistics* 7 (5): 570–596. doi:10.1504/IJSTL.2015.072021.

Verhoeven, P. 2010. "A Review of Port Authority Functions: Towards A Renaissance?" *Maritime Policy & Management* 37 (3): 247–270. doi:10.1080/03088831003700645.

Verhoeven, P. 2014. "Port Privatisation in the United Kingdom and Continental Europe: An Evaluation of past Experience and New Drivers." In *Port Infrastructure Finance*, edited by H. Meersman, E. Van de Voorde, and T. Vanelslander, 111–140. London: Taylor.

Verhoeven, P., and T. Vanoutrive. 2012. "A Quantitative Analysis of European Port Governance." *Maritime Economics & Logistics* 14 (2): 178–203. doi:10.1057/mel.2012.6.

Vieira, G., R. Silva, F. Neto, L. Senna, and A. Mulinas. 2014. "Port Governance Model by Managers' and Customers' Point of View: A Study at Port of Valencia, Spain." *International Business Research* 7 (8): 1–16. doi:10.5539/ibr.v7n8p1.

Villa, J. C. 2017. "Port Reform in Mexico: 1993–2015." *Research in Transportation Business & Management* 22: 232–238. doi:10.1016/j.rtbm.2016.11.003.

Wang, C., Q. Chen, and R. Huang. 2018. "Locating Dry Ports on A Network: A Case Study on Tianjin Port." *Maritime Policy & Management* 45 (1): 71–88. doi:10.1080/03088839.2017.1330558.

Wilmsmeier, G., and R. Sánchez. 2017. "Evolution of National Port Governance and Interport Competition in Chile." *Research in Transportation Business & Management* 22: 171–183. doi:10.1016/j.rtbm.2017.01.001.

World Bank. 2007. *Port Reform Toolkit*. 2nd ed. Washington: The International Bank for Reconstruction and Development / The World Bank.

Yu, H., Y. Ge, J. Chen, L. Luo, D. Liu, and C. Tan. 2017. "Incorporating Container Location Dispersion into Evaluating GCR Performance at a Transhipment Terminal." *Maritime Policy & Management*. doi:10.1080/03088839.2017.1410243.

Appendix 1. Observed variables mean and std. deviation.

Variable	Mean	Std. deviation
Efficiency	6,63	,79
Merit managers	6,54	,77
Effectiveness	6,50	,86
Strategy accepted by all port	6,43	,85
Regional development	6,09	1,14
Autonomy of each port	5,94	1,06
PA Facilitator	5,88	1,34
PA balanced accounts	5,88	1,22
Operation by private companies	5,81	1,02
Entrepreneur PA	5,80	1,22
Business PA	5,76	1,24
Feasibility	5,70	1,29
Clear strategy	5,68	1,98
No conservative PA	5,66	1,51
Concession of operation	5,64	1,12
Cooperation focus	5,57	1,14
PA Internal control	5,54	1,21
Autonomous PA	5,44	1,32
PA internationalization	5,37	1,26
Independent port regulator	5,37	1,74
PA negotiate prices	5,33	1,35
Intra-port competition	4,85	1,45
Private port	4,81	1,49
Port community in PA management	4,73	1,65
Operation focus	4,70	1,70
Main role of PA in logistics chain	4,70	1,63
Small ports city management	4,64	1,72
PA operates rail and logistics	4,55	1,88
State company	4,42	1,90
PA competition focus	4,40	1,67
Neighborhood PA joint management	4,38	1,83
Public owned	4,38	1,99
Region in PA management	4,28	1,64
Port fusion	4,17	1,87
State approves PA Prices	4,06	1,78
PA depends from region	3,88	1,74
PA pays dividends to State	3,55	1,84
National PA	3,42	2,12
State control	3,22	1,66
State PA	3,06	1,66
Public aid to port	2,89	1,55
PA operator	2,86	1,74
PA state department	2,72	1,76
Political managers	2,13	1,51