

Port Governance Model by International Freight Forwarders' Point of View: A Study at Port of Santos - Brazil

Guilherme B. B. Vieira, Rafael M. da Silva, Eliana T. P. Senna, Luiz A. S. Senna, Francisco J. Kliemann Neto

Abstract—Due to the importance of ports to trade and economic development of the regions in which they are inserted, in recent decades the number of studies devoted to this subject has increased. Part of these studies considers the ports as business agglomerations and focuses on port governance. This is an important approach since the port performance is the result of activities performed by actors belonging to the port-logistics chain, which need to be properly coordinated. This coordination takes place through a port governance model. Given this context, this study aims to analyze the governance model of the port of Santos from the perspective of port customers. To do this, a closed-ended questionnaire based on a conceptual model that considers the key dimensions associated with port governance was applied to the international freight forwarders that operate in the port. The results show the applicability of the considered model and highlight improvement opportunities to be implemented at the port of Santos.

Keywords—Port Governance, Model, Port of Santos, Customers' Perception.

I. INTRODUCTION

PORTS are essential for trade and economic development of the regions in which they are located. In recent decades, the number of studies dedicated to the subject has increased [1]. Some of these studies have addressed the ports as business agglomerations (clusters, chains and networks). This approach is important because port performance is the result of activities performed by actors belonging to the port logistics chain, which need to be properly coordinated [2]. This coordination takes place through a port governance model, which should consider the existing structure of governance, the established actions of governance and the elements on which these actions are implemented [3], as well as the outcomes of governance [4].

The port of Santos in 2012 occupied the 43rd position in the world ranking of container throughput, according to data from Containerisation International Yearbook 2012 [5], with 2.7 million TEUs. This is the largest container throughput among Latin American ports. Moreover, in 2013 the port of Santos

G. B. B. Vieira is professor with the Universidade de Caxias do Sul (UCS), Brasil and researcher at Universidade Federal do Rio Grande do Sul (UFRGS), Brasil (phone: 555199448504; e-mail: gbvieira@cpovo.net).

R. M. da Silva, researcher, L. A. S. Senna, professor and researcher, and F. J. Kliemann Neto, professor and researcher, are with the Universidade Federal do Rio Grande do Sul (UFRGS), Brasil (e-mail: rafmozart@terra.com.br, lsenna@producao.ufrgs.br, kliemann@producao.ufrgs.br).

E. T. P. Senna is professor and researcher with the Centro Universitário Univates (UNIVATES), Brasil (e-mail: lsennas@terra.com.br).

was responsible for 36.1% of the total container throughput in Brazil, with 3.22 million TEUs handled, according to the National Agency for Waterway Transportation [6].

Given the importance of governance for port performance and the importance of the port of Santos for Brazilian port sector, this study aims to analyze the governance of the Santos port-logistics chain from the perspective of the international freight forwarders (IFFs) that operate in this port.

II. PORT GOVERNANCE MODEL

A governance model should answer three basic questions: i) Who governs? ii) What is governed? and iii) How is it governed? The answers to these questions are, respectively: i) the structure of governance; ii) the elements of governance; and iii) the actions of governance [3]. The structure of governance refers to the institutional and regulatory framework existing in business clustering, elements of governance are the actors belonging to the agglomeration and the associated logistics flows, and actions of governance are the mechanisms inducing coordination. Besides that, a previous question can be asked (Why is it governed?), which refers to the outcomes of governance associated with the efficiency of business clustering, in this case, the port logistics chain [4]. The ultimate objective of port governance is to promote the performance of the port logistics chain through a particular governance model [2], [7]-[10].

Despite its importance, few models of port governance are found in the literature, namely the Baltazar and Brooks model [7] - detailed in later studies by Brooks and Cullinane [8] and Brooks and Pallis [11]; the Brooks and Cullinane model [9]; the Verhoeven model [12] and the Milan and Vieira [13], in addition to the models of port management and ownership by the World Bank [14]. Of these models, the first three stand out, given that the Verhoeven [12] and World Bank [14] models focus only on port structure and functions and the Milan and Vieira model [13] only examines the actions of governance, called by the authors 'practices of governance'. Therefore, these models do not address the relationship between governance and performance broadly enough and, therefore, have limited applicability. Additionally, the Baltazar and Brooks model [7] and its subsequent adjustments proposed by Brooks and Cullinane [8] and Brooks and Pallis [11] also show gaps [4]. The gaps identified in these models were the following [4]: i) the outcomes of governance are not sufficiently detailed; ii) a broader discussion about typology of actions of governance and means of implementation is

missing; iii) the aspects related to the actors of the port logistics chain and flows arising from the interaction of these actors are not covered; and iv) the models do not provide means to be implemented in a port reform process, which limits its applicability.

Aiming to fill these gaps, Vieira, Kliemann Neto and Monfort [4] developed a new model based on the dimensions of governance proposed by Geiger [3] and which includes an additional dimension: the outcomes of governance, which refers to performance evaluation and to the identification of measures related to the governance of port logistics chains. The conceptual framework of the model is shown in Fig. 1.

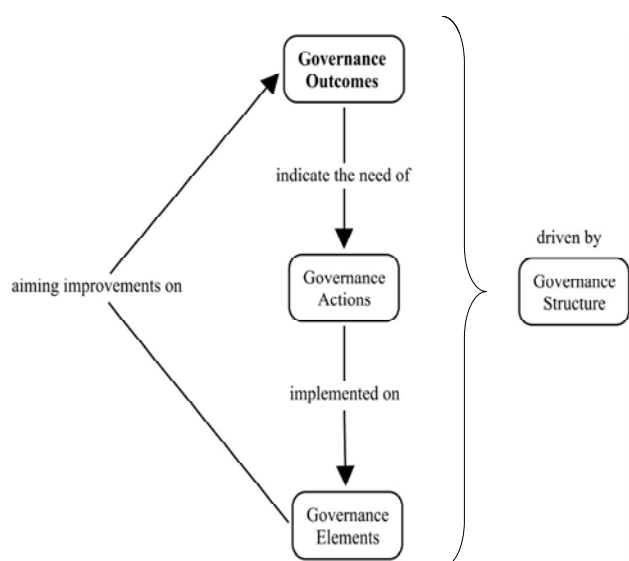


Fig. 1 Port governance model: conceptual framework [14]

Dimensions	Factors
Governance Outcomes	<ul style="list-style-type: none"> - Port effectiveness - Port efficiency - Port costs - Maritime connections (number of liner shipping services) - Frequency of liner shipping services
Governance Structure	<ul style="list-style-type: none"> - Existence of a governance structure - Effectiveness of the governance structure - Improvement of the governance structure over time
Governance Actions	<ul style="list-style-type: none"> - Existence of governance actions for the coordination of the actors of port logistics chain - Existence of governance actions to coordinate the containers flow in this chain - Existence of governance actions to coordinate the information flow - Effectiveness of governance actions - Improvement of governance actions over time
Governance Elements	<ul style="list-style-type: none"> - Coordination of the actors within the port logistics chain - Increasing of coordination over time - Efficiency of container port logistics flow - Increasing of containers flow efficiency over time - Efficiency of information flow - Increasing of information flow efficiency over time

Fig. 2 Dimensions and factors of the governance model [14]

The logic of this model is that the outcomes of governance

(why the port is governed) indicate the need for actions of governance (how the port is governed) in order to increase the integration of the port logistics chain and the efficiency of the related flows, which are the elements of governance (what is governed), all driven by the existing structure of governance (who governs).

Based on the dimensions of the model presented in Fig. 1, and given the need for measuring the governance of port logistics chains, the authors [4] proposed a breakdown of each proposed dimension in some factors (Fig. 2). This breakdown allows for an evaluation of these factors by the customers - by applying evaluation questionnaires based on assertions for each factor, evaluated by means of a Likert scale. The basic assumption is that an appropriate governance model promotes the integration of actors of the port logistics chain, which, in turn, facilitates the coordination of physical and informational flows of that chain, thus increasing the efficiency of the port.

In order to be considered adequate, the governance model should provide a framework that facilitates the execution of actions, which, in turn, allow actors and flows to be coordinated, generating an increase in the efficiency and efficacy of the chain. The structure should be decentralized enough to allow the effective management of ports - given the local conditions and the need for understanding the demands of the port environment - and centralized enough to allow the coordination (governance) of the port system and the creation of an appropriate competitive environment, avoiding, for example, lack of regulation that generates overcapacity in some ports. Actions of governance may vary, but initiatives stand out regarding: i) the quality of the port logistics chain; ii) the information technologies used to integrate actors and flows; iii) the training of the actors within the port logistics chain; and iv) the management of port-city relationships [13].

Fig. 3 shows the steps for the application of the model on a port reform process. A port reform process involves [11], [14]: i) the (re)definition of the roles and responsibilities of national and local public authorities in charge of the port sector; ii) the (re)definition of resources needed to support each function and category of port service, evaluating the appropriateness of assets and determining which services and related assets must be operated by the private sector; and iii) the (re)definition of the roles of various actors (public and private) acting on the ports, in order to better coordinate port operations.

From the model proposed, there is a comprehensive and structured logic to guide the process of port reform, allowing adjustments in the existing governance model, aiming to better governance of the port logistics chain as well as greater competitiveness of this chain [4]. In order to attain that, a systematic evaluation of port logistics chains in different dimensions of the model (structure, actions, elements and outcomes) is needed, considering the factors associated with each dimension, as shown in Fig. 2 [4].

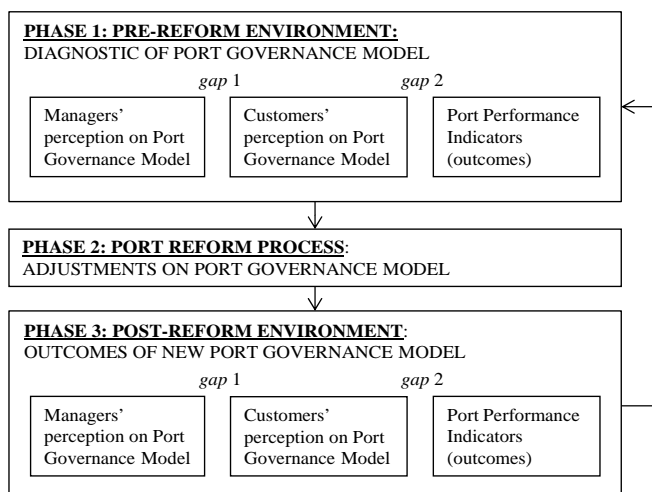


Fig. 3 Steps for the application of the model in a port reform process (Source: Adapted from [14])

III. METHODOLOGICAL PROCEDURES

This article is a descriptive study with quantitative approach. The data collection was based on questionnaires applied to the port customers. The questionnaire was based on the conceptual governance model and its dimensions. Each dimension was broken down into a few factors according to Fig. 2. For each of these factors a statement was written, which was evaluated using a seven-point Likert scale (1. Strongly Disagree to 7. Strongly Agree). Moreover, some questions were asked in order to qualify companies and respondents (time with company; volume of containers handled, length of experience etc.).

As a population, were considered the international freight forwarders (IFFs) active in the port studied. Because it was not possible to obtain this information from the Port Authority, the list of freight forwarders registered in the Nautical Guide was considered, totaling 247 companies. We opted to send the questionnaires to this group of intermediaries and not directly to end users (exporters and importers) due to the fact that IFFs are key influencers of the port selection process and the process of port choice is within the selection of a freight forwarder that provides a service through the port [15].

With the application of questionnaires, a number of 31 valid questionnaires out of 247 questionnaires were received. With the analysis of data collected, the port governance model was analyzed from the perspective of port users. The results obtained with the application of the considered model allowed to critically analyzing their strengths and limitations, to analyze governance of port of Santos, and to explore relationships between the outcomes, the structure, the actions and the elements of governance in such port. It should be emphasized that the present study focused on the step 2 of Phase 1 of the port governance model considered, generating elements that could potentially supply the following steps and phases.

IV. ANALYSIS AND RESULTS

This chapter shows an analysis of the governance of the port of Santos from the perspective of port customers (IFFs).

A. Sample Characterization

The sample used in the research is characterized by the following data: i) number of employees from the companies where the respondents work for; ii) companies' operation time in business; iii) annual quantity of containers handled (loading and unloading) in the port of Santos by companies; iv) percentage of containers handled (loading and unloading) in the port of Santos on the total handled by companies; and v) respondents' work experience length.

Table I presents the distribution of responses according to the number of employees from companies where the respondents work.

TABLE I
NUMBER OF EMPLOYEES FROM THE COMPANIES WHERE THE RESPONDENTS WORK

Total of Employees	Nº of answers	%
0 to 10	6	19.4%
11 to 50	8	25.8%
51 to 100	5	16.1%
101 to 300	3	9.7%
301 to 500	5	16.1%
over 500	4	12.9%
Total of respondents	31	100.0%

Regarding to the length of time that companies operate in the market, the sample comprises 25 companies with over 5 years' time experience in business, four companies with 3 to 5 years of experience, and two with 1 to 3 years. Therefore, a percent of 80.6% of the companies in which the respondents work for operate for over 5 years.

TABLE II
LENGTH OF TIME THE COMPANIES OPERATE IN THE MARKET

Companies' time in business	Valencia	%	Santos	%
Under 1 year	0	0%	0	0.0%
1 to 3 years	0	0%	2	6.5%
3 to 5 years	1	3.3%	4	12.9%
5 to 10 years	1	3.3%	9	29.0%
Over 10 years	28	93.3%	16	51.6%
Total Answers	30	100.0%	31	100.0%

Table III presents the number of containers handled by the companies the respondents belong to in both export and import. A concentration from 1,001 to 10,000 and over 10,000 containers per year was noticed, representing 67.7% of the loaded containers and 83.9% of the unloaded.

Table IV presents the representativeness of the port of Santos in the total amount of containers loaded and unloaded by the companies which the respondents work for. The data presented in Table IV show a significant representativeness in percentage terms of the port of Santos in the total handling of containers of the companies which the respondents work for. This percentage is, on average, more than 60%, ranging from a minimum of 10% to a maximum of 99%.

TABLE III
NUMBER OF CONTAINERS HANDLED

Containers/ year	Loaded		Unloaded	
	n° ans.	%	n° ans.	%
up to 10	0	0.0%	0	0.0%
from 11 to 100	2	6.5%	1	3.2%
from 101 to 1,000	8	25.8%	4	12.9%
from 1,001 to 10,000	12	38.7%	18	58.1%
over 10,000	9	29.0%	8	25.8%
Total Answers	31	100.0%	31	100.0%

TABLE IV
PERCENTAGE OF CONTAINERS HANDLED OVER ALL OPERATIONS IN THE PORTS

% of containers	% Loaded	% Unloaded
Minimum	25	10
Maximum	99	99
Mean	61.4	62.5
Standard Deviation	17.7	23.8

The data from Table IV allow affirming that the analyzed ports are important for the companies, which suggests the need for a constant self-evaluation and justifies the IFFs as an important source of information on the governance in the port logistics chain.

Table V presents the experience of respondents with port logistics operations and foreign trade. Although the data show considerable variability, a high average work experience time (18.4 years) was noticed.

TABLE V
RESPONDENTS' WORK EXPERIENCE (IN YEARS)

Experience Time	N° of years
Minimum	2
Maximum	40
Mean	18.4
Standard Deviation	9.5

In addition, no respondents presented less than two years of experience, which facilitates their understanding about the port logistics reality.

B. Evaluation of the Governance Model

With respect to port governance model, the range near 3 in a scale ranging from 1 to 7 (Table VI) indicates that respondents disagree with the statements presented in the questionnaire about the results, the structure, the actions and the elements of governance. In other words, the respondents disagree that: i) the port meets their needs and offers efficient operations, as well as that maritime connections and frequency of liner shipping services are adequate; ii) there is a normative and institutional governance structure that facilitates the coordination of port logistics chain and that it has been improved over time; iii) actions for the coordination of port logistics chain has been developed and enhanced; and iv) there is port logistics chain coordination and such coordination has improved over time.

When punctually analyzing the results from the users' responses for the 19 statements of the questionnaire (Table

VI), it can be seen that for six questions (Q4, Q5, Q13, Q15, Q17 and Q19) a mean of more than 3.5 (central point of the scale) was obtained and just for one question (Q5) the mean was greater than 4. For the remaining 13 affirmatives, the averages of the responses were lower than 3.5, ranging from 2.13 to 3.45.

TABLE VI
DESCRIPTIVE STATISTICS OF THE SAMPLES

Question/ Dimension	Mean	Standard Deviation
Question 1	3.2258	1.45395
Question 2	2.9355	1.48179
Question 3	2.1290	1.14723
Question 4	3.6129	1.83807
Question 5	4.5806	1.56576
Outcomes	3.2968	1.24565
Question 6	3.0645	1.45912
Question 7	2.9032	1.32551
Question 8	3.4516	1.45691
Structure	3.1398	1.24059
Question 9	3.2258	1.38347
Question 10	3.1613	1.34404
Question 11	3.2581	1.23741
Question 12	2.8065	1.16674
Question 13	3.6129	1.49839
Actions	3.2129	1.05696
Question 14	3.0323	1.22431
Question 15	3.5161	1.20750
Question 16	3.4194	1.08855
Question 17	3.7097	1.27000
Question 18	3.4516	1.33763
Question 19	3.6774	1.42331
Elements	3.4677	1.05270

Furthermore, for all dimensions the outcomes were lower of 3.5, ranging from 3.14 to 3.46. These results indicate a considerable space for improvement actions on the port governance of Santos.

V. CONCLUSIONS

The analyses of the questionnaires revealed that IFFs disagree with the statements regarding the existence and adequacy of the four dimensions of port governance in Santos. Furthermore, no significant gaps were identified between the different dimensions. This alignment obtained to the different dimensions indicates the consistency of the conceptual model considered.

The degree of agreement under 3.5 (on a scale of 1 to 7) with the affirmatives presented in the questionnaire, which sought to measure their perception regarding the existence, relevance and evolution of governance structure, actions, elements and outcomes, revealed improvement opportunities for consideration by Santos' Port Authority.

However, notwithstanding its contribution, some limitations from this study must be stressed. The first of these limitations relates to the partial application of the model, which was restricted to its step 2 of phase 1. Secondly, due to the fact that this is a cross-sectional study, it has not been possible to

analyze the evolution of governance over time.

As an indication for future studies, it is suggested: i) the complete application of the model, considering a port reform process in its three phases and conducting a longitudinal analysis of the outcomes of governance at the different phases; ii) application of the model to other ports, subject to different models of port management; and iii) promote an in-depth discussion on outcomes of governance from the studies that have already carried out on port performance analysis.

REFERENCES

- [1] Heaver, T. (2006). The Evolution and Challenges of Port Economics. *Research in Transportation Economics*, v. 16, n. 1, p. 11-41. doi: 10.1016/S0739-8859(06)16002-3
- [2] De Langen, P. W. Governance in Seaport Clusters. (2004). *Maritime Economics and Logistics*, v. 6, n. 1, p. 141-156. doi: 10.1057/palgrave.mel.9100100
- [3] Geiger, A. (2009). *Modelo de governança para apoiar a inserção competitiva de arranjos produtivos locais em cadeias globais de valor*. Tese de Doutorado. Programa de Pós-Graduação em Engenharia de Produção (PPGEP). Universidade Federal do Rio Grande do Sul (UFRGS), Porto Alegre.
- [4] Vieira, G. B. B.; Kliemann Neto, F. J., & Monfort-Mulinas, A. (2013). O modelo de governança portuária revisitado: Uma contribuição para o processo de reforma portuária. *Revista Espacios*, v. 34, n. 10, p. 6.
- [5] Containerisation International. *Containerization International Yearbook 2012*.
- [6] Brasil. Agência Nacional de Transporte Aquaviário (ANTAQ). *Boletim Anual de Movimentação de Cargas 2013*. Análise da Movimentação de Cargas nos Portos Organizados e Terminais de Uso Privado. Brasília, 2014. Disponível em: <http://www.antaq.gov.br/Portal/Anuarios/Anuario2013/Tabelas/AnaliseMovimentacaoPortuaria.pdf>. Acesso em: 11.jul.2014.
- [7] Baltazar, R., & Brooks, M. R. (2006). Port governance, devolution and the Matching Framework: a configuration theory approach. *Research in Transportation Economics*, v. 17, n. 1, p. 379-403. doi: 10.1016/S0739-8859(06)17017-1
- [8] Brooks, M. R.; & Cullinane, K. (2006a). Conclusions and research agenda. Devolution, Port Governance and Port Performance. *Research in Transportation Economics*, v. 17, n. 1, p. 631-660. doi: 10.1016/S0739-8859(06)17026-2
- [9] Brooks, M. R., & Cullinane, K. (2006c). Governance models defined. *Research in Transportation Economics*, v. 17, n. 1, p. 405-435. doi: 10.1016/S0739-8859(06)17018-3
- [10] Cullinane, K., Yap, W. Y., & Lam, J. S. L. (2006). The port of Singapore and its governance structure. *Research in Transportation Economics*, v. 17, n. 1, p. 285-310. doi: 10.1016/S0739-8859(06)17013-4
- [11] Brooks, M. R., & Pallis, A. A. (2008). Assessing port governance models: process and performance components. *Maritime Policy and Management*, v. 35, n. 4, p. 411-432. doi: 10.1080/03088830802215060
- [12] Verhoeven, P. (2010). A review of port authority functions: towards a renaissance? *Maritime Policy and Management*, v. 37, n. 3, p. 247-270. doi: 10.1080/03088831003700645
- [13] Milan, G. S., & Vieira, G. B. B. (2011). Proposição de um modelo conceitual em torno da prática da governança em cadeias logístico-portuárias. *Revista Gestão Industrial*, v. 7, n. 4, p. 154-174. doi: 10.3895/S1808-04482011000400008
- [14] World Bank. (2001). Framework for Port Reform. *World Bank Port Reform Tool Kit*, Module 1, p. 1-20. Available on: <http://www.ppiaf.org/sites/ppiaf.org/files/documents/toolkits/Portoolkit/Toolkit/pdf/modules/01_TOOLKIT_Module1.pdf> Access on: 29.Aug.2013.
- [15] Malchow, M. B., & Kanafani, A. (2004). A disaggregate analysis of port selection. *Transportation Research Part E: Logistics and Transportation Review*, v. 40, n. 4, p. 317-337. doi: 10.1016/j.tre.2003.05.001