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Opportunities for research on evaluation of seaport performance: A systemic analysis from international literature

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The purpose of this article is to analyze the opportunities for research on the theme evaluation of seaport performance through the investigation of a bibliographic portfolio of articles with scientific relevance. In order to reach this goal, the intervention tool used was ProKnow-C (*Knowledge Development Process – Constructivist*), which consists of a structured process for the generation of knowledge on a determined theme from the interests and limitations of the researcher, following a constructivist view and requiring a constant interaction between the researcher and the object of his research. The highlighted results are the identification of the main characteristics of the scientific publications about performance evaluation and the proposition of opportunities for research to researchers and seaport manager from the theoretical affiliation adopted for the theme performance evaluation. It was concluded that: (i) most researches about performance evaluation, aim at measuring the operational efficiency of seaports; (ii) the evaluation criteria do not contemplate and evaluate the performance of all the agents that play a role in the seaport environment; and (iii) the evaluation tools used do not show evidence as where and how to intervene to improve the performance measured. Thus, challenges emerge for researchers and also for seaport managers.

Key words: Seaport management, evaluation of seaport performance, systemic analysis, opportunities for research, ProKnow-C (Knowledge Development Process – Constructivist).

INTRODUCTION

Seaports play a key role in the efficiency and efficacy of transportation means, as well as in the competitiveness

and connectivity of countries (Oliveira and Cariouz, 2005), and are also essential for the development of a

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country's economy, since they contribute significantly for the construction of public infrastructure and for the promotion of industrial activities. Preoccupations with efficiency and efficacy lead to performance evaluation as a tool to support seaport management. Performance evaluation plays a strategic role in all areas of business management for it explains the trajectory of organizations, but mainly to what extent and how they have reached their goals, and also provides subsidies to the decision-making process (Dyson 2000). In this context, the seaport industry is inserted permeated by the growing competitiveness and constant demands by clients for the improvement of the quality of the services offered (Woo et al., 2011; Lam and Voordez, 2011; Chang, 2013).

An adequate and precise process of performance evaluation of a seaport not only helps to understand and improve your marketing and competitive position, but also provides a clear and solid basis for formulators of policies for local and regional development (Wu et al., 2009). Turner (2000) claims that a seaport should be seen as a system as opposed to a group of terminals and independent operators, focusing on the global performance of the system, always taking into consideration the contribution and interdependence of the agents involved in the seaport environment.

The evaluation of seaport performance and its evolution in medium and long terms (Al-Eraqi et al., 2008) requires management capability, i. e., competence to mobilize the resources and agents involved in the search of constant improvements as a systematic and continuous process, permeated all over the organization and being guided by the strategic objectives dismembered for tactical and operational levels. This requires methodologies and tools for performance evaluation, usually proposed by researchers and incorporated to the everyday routine of the management to support and subsidize the decision-making process (Liu et al., Zhao 2009; Lam and Song, 2013).

In this context, from the theoretical affiliation adopted by the authors about the theme performance evaluation, the critical analysis of the selected scientific literature was carried out aiming at the answer to the question: What are the opportunities for research on seaport performance evaluation?

Thus, the goal of the current article is to identify and analyze the opportunities for research on the theme evaluation of seaport performance through the investigation of a bibliographic portfolio of scientifically relevant articles. In order to reach this objective, the intervention tool Proknow-C (*Knowledge Development Process – Constructivist*) was used, which allowed: (i) the selection of the bibliographic portfolio represented by a group of articles with recognition and scientific relevance; (ii) the identification of the main characteristics of the

bibliographic portfolio, such as: most relevant articles, most cited articles, most relevant authors and most used performance evaluation methodologies; (iii) the systemic analysis of the articles of the bibliographic portfolio through the comparison of the theoretical affiliation on the theme performance evaluation with the content of each scientific article.

The tool ProKnow-C consists of a structured process whose goal is to generate knowledge for a determined researcher based on his interests and limitations according to a constructivist view and, thus, requiring a constant interaction between the researcher and his object of research. Hence, the relevance of the current research is evidenced in the methodological contribution for a researcher to identify research gaps from a certain theme according to the existing scientific literature. It will then explicit the frontiers of knowledge and possible paths to follow when investigating.

SYSTEMIC REVIEW OF THE SCIENTIFIC LITERATURE

The central axis of the current research consists of the systemic review of the scientific literature operationalized through the tool ProKnow-C. So the fundamentals of the study evidence what it is and what is the importance of systemic or systematic analysis, as denominated by some researchers.

To Gu and Lago (2009), a systematic review of literature is an approach based on evidences to thoroughly describe relevant studies to some questions of previously defined researches; select material for critical analysis; evaluate and synthesize the findings; and answer investigation questions. Systematic reviews usually include oriented investigation question, strategies of explicit search, explicit selection criteria, qualitative, and also synthesis-quantitative.

Mazzi (2011) affirms that the objective of the systematic review is to provide subsidies that contribute to the areas of interest of the research, to enhance the methodological seriousness, to help in the development of a reliable knowledge basis, help in the organization of the research, provide a critical evaluation and identify the gaps in the current research to bring opportunities for future investigations. However, the author does not structure a way to perform such analysis.

Among the positive results of the systematic analysis of the literature, the following items were mentioned: help the researcher obtain scientific support for his study by structuring the collection and analysis of existing papers, a basic task for an in-depth knowledge in any research theme (Karlsson 2008; Gu and Lago 2009; Cho and Egan 2010; Mazzi, 2011; Ginieis et al., 2012); justify the choice of the theme and the contribution of the research proposal (Karlsson, 2008; Savolainen et al., 2012; Ginieis

et al., 2012; Colicchia and Strozzi, 2012); generate a justification to delimitate the research (Karlsson, 2008); critically analyze the literature and guide towards the treatment of comprehensive and disperse information (Karlsson, 2008; Gu and Lago, 2009; Cho and Egan, 2010; Mazzi, 2011); minimize the possibility of bias in the research (Gu and Lago, 2009); identify the stage of the studied field and evidence opportunities for the continuity of such investigations (Colicchia and Strozzi, 2012). From the reasons shown, it can be perceived how important it is to carry out a systematic and/or systemic analysis of the literature.

This article is structured as follows: Section 1 includes the Introduction, Section 2 the Theoretical Framework focusing on systemic review of scientific literature; Section 3 to Research Methodology; Section 4 Presentation and Discussion of Results; Section 5 Opportunities for Further Research; Section 6 the conclusions and, finally, the Bibliographical References used throughout the article.

METHODOLOGIES OF THE RESEARCH

Framework of the research

The objective of this study (to identify opportunities for future research about the theme evaluation of seaport performance) has constructivism as a basic philosophical informed by the perspective of Roy (1993), that tries to build, with and for the participants, a “set of keys” (Creswell, 2014, 194) based on its objectives and system of values so that it helps in the understanding the context in which they plan to intervene through a qualitative approach (Creswell, 2014), substantiated on the choices and preferences of the researchers both in the selection of the bibliographic portfolio and the systemic analysis of the articles of the BP. As for the object, the current research can be labeled as exploratory, for it explores a fragment of literature that deals with the theme evaluation of seaport performance, aiming at the identification of the characteristics of such publications and opportunities for future researches (Gil, 2008).

Concerning technical procedures, this project used a bibliographic research in the research-action of the content analysis (Richardson, 2007).

The bibliographic research is a result of the identification and analysis of articles published in international databases; the research-action is a result of the interaction of the researchers with the object of their research in the operationalization of ProKnow-C, requiring their choices and delimitations; the content analysis is a result of the analysis of the theoretical affiliation of the theme performance evaluation through an analytical standpoint that requires the critical reading and interpretation of the articles that make up the Bibliographic Portfolio.

As for the data collection, both primary and secondary data were used. In the step Selection of the Bibliographic Portfolio used primary data, since the delimitations are established by the researchers in all the choices required during this process. On the other hand, the steps of bibliometric analysis and systemic analysis used secondary data, once the characteristics are searched in the BP and in the comparison of the theoretical affiliation with the articles of the BP. The data collection happened in the month of October 2013 and the research on the theme “Evaluation of Seaport Performance” considered the articles published up to 2013.

The intervention tool ProKnow-C

The current study uses the intervention tool denominated ProKnow-C (*Knowledge Development Process–Constructivist*), which was developed by LabMCDA (Laboratory of Multicriteria Methodologies to Support Constructivist Decision) from Federal University of Santa Catarina (UFSC) – Brazil. The dissemination of the instrument occurred through several scientific publications in journals in the English language, highlighting Azevedo et al. (2013); Stefano and Filho (2013); Lacerda et al. (2011, 2012, 2014); Rosa et al. (2012) and Tasca et al. (2010) and in the native tongue of the proponents of ProKnow-C, highlighting Ensslin et al. (2012); Lacerda et al. (2012); Sartori et al. (2014); Ensslin et al. (2014); Dutra et al. (2015); Ensslin et al. (2015). The main objective of ProKnow-C is to build knowledge in a determined researcher from his interests, choices and delimitations, according to a constructivist view.

The steps of ProKnow-C represented in Figure 1 can be summarized like this: Step 1 Selection of the Bibliographic Portfolio aims at the identification, in literature, the scientific publications that refer to the theme delimited by the researcher and involves three sequential sub steps, which are the selection of the raw bank of articles; filtering of the bank of articles; application of the test of representativeness of the Bibliographic Portfolio – BP (Lacerda et al., 2012; Rosa et al. 2011; Sartori et al. 2014); step 2, Bibliometry, aims at the identification of the characteristics of the publications in the area of knowledge being investigated in order to generate knowledge in the researcher through the counting of occurrences of a determined variable (characteristic) in the publications of the BP (Ensslin et al., 2012; Rosa et al. 2011, 2012; Lacerda et al., 2012; Ensslin et al. 2014); step 3, the Systemic Analysis, aims at the identification of opportunities and gaps in researches from the critical analysis of the articles of the BP before a theoretical affiliation defined by the researcher (Lacerda et al., 2014); and step 4, Question of the Research, step where the researcher generates enough knowledge on the fragment of literature/reality being investigated, then being able to identify “where” and “how” he should intervene scientifically and justify such choice in a substantiated manner. The four stages of ProKnow-C instrument were applied, especially the last step that highlighted the opportunities for future research, from the identified gaps with the analysis of bibliographic portfolio.

For the application of ProKnow-C, besides the definition of the central theme of the research, “Evaluation of Seaport Performance”, the researchers selected the keywords through two axis, which resulted in the search command: [“(Performance Evaluation” or “Performance Assessment” or “Performance Appraisal” or “Performance Measurement” or “Performance Management”) and (“Port” or “harbor” or “Seaport”)]. The scientific basis chosen for the research were: *EBSCO Academic Search Premier; ProQuest; Isi Web of Knowledge; Scopus; Science Direct; and Willey Interscience Blackwell.*

The procedures of selection and filtering of the articles are demonstrated in Figure 2. The operationalization of the first step of the tool ProKnow-C resulted in 23 articles, henceforth denominated articles of the Bibliographic Portfolio (BP). The 23 articles that make up the BP articles can be verified in Table 1 with the corresponding titles/authors, journals and year of publishing.

After concluding the synthesis of the step Selection of the Bibliographic Portfolio of ProKnow-C, the process used for the realization of the systemic analysis was described.

The process of systemic analysis

The systemic analysis consists of a structured process of critical analysis of the articles of the BP from a group of presuppositions

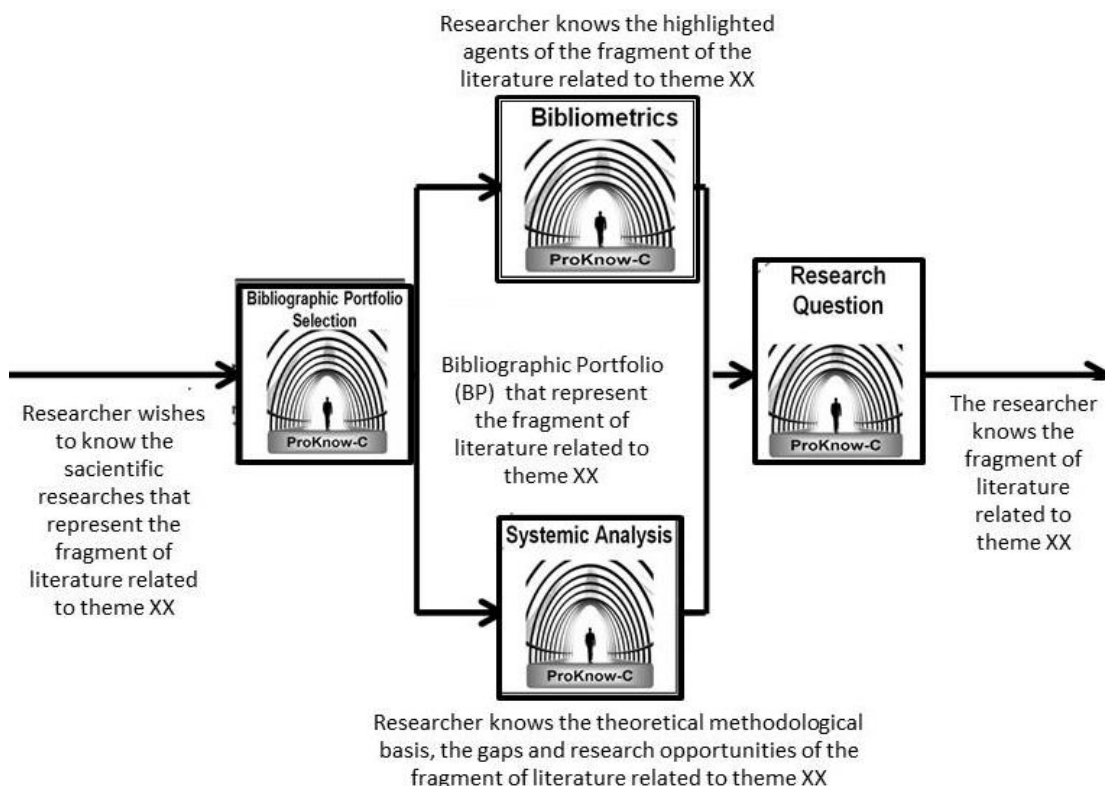


Figure 1. ProKnow-C and its step. Source: Adapted from Ensslin, Ensslin, and Pinto (2013); Lacerda, Ensslin, and Ensslin (2012); and Tasca et al.(2010).

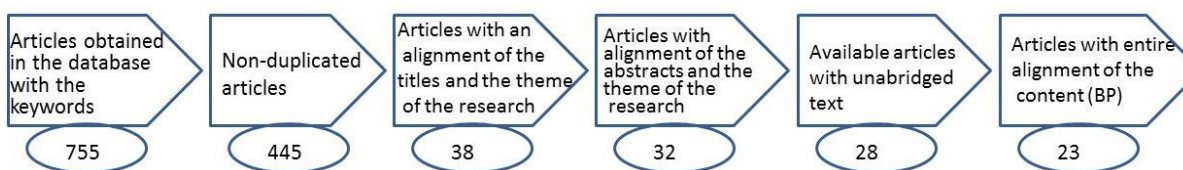


Figure 2. Procedures of selection and filtering of the articles. Source: Elaborated by the authors (2014).

defined by the researcher informed by the theoretical affiliation adopted, aiming at the identification of research gaps. Such presuppositions can be characterized: (i) as lenses, according to the model of Brunswik adapted for human judgment (Brunswik et al., 2001), (ii) as a worldview (Lacerda et al., 2014), for evidencing the way the researcher perceives the characteristics present in the environment; and (iii) as filters that are a result of the different interpretation frames molded by beliefs, values, expectations and previous experience (Melão and Pidd, 2000). The theoretical affiliation adopted in this research for the theme performance evaluation is grounded on a constructivist approach and consists of the process of construction of knowledge in the decider within a specific context through the identification, organization, measurement and integration of the aspects considered relevant to evidence the performance, also contemplating the generation of actions of improvement from the profile of the performance obtained (Lacerda et al., 2014). From the theoretical affiliation, the

lenses presented in Table 2 emerge, duly contextualized. The definition of the lenses requires a theoretical affiliation that supports the choices of the researchers represented by the lenses that result from the perceptions and values before the context that is being analyzed. The BP is characterized as a sample of the literature, deemed valid for the researchers from the objectives of their research.

PRESENTATION AND DISCUSSION OF THE RESULTS

Result of the bibliometry

The application of the intervention tool ProKnow-C enabled the identification of several characteristics of the BP articles, whose synthesis is presented in Table 3.

Table 1. Bibliographic portfolio (BP).

Order	Title	Journal	Author(s)	Year
1	Application of a fuzzy multi-criteria decision-making model for shipping company performance evaluation	Maritime Policy and Management	Chou TY, Liang GS	2001
2	The Self Diagnosis Method: A new methodology to assess environmental management in sea ports	Marine Pollution Bulletin	Darbra RM, Ronza A, Casal J, Stojanovic TA and Wooldridge C	2004
3	Evaluating seaport policy alternatives: A simulation study of terminal leasing policy and system performance	Maritime Policy and Management	Turner HS	2000
4	Efficiency of middle eastern and East African seaports: Application of DEA using window analysis	European Journal of Scientific Research	Al-Eraqi AS, Mustafa A, \Khader AT and Barros CP	2008
5	Environmental performance evaluation of an industrial port and estate: ISO14001, port state control-derived indicators	Journal of Cleaner Production	Saengsupavanich C, Coowanitwong N, Gallardo WG and Lertsuchatavanich C	2009
6	Green management practices and firm performance: A case of container terminal operations	Resources, Conservation and Recycling	Lun YHV	2011
7	Performances and benchmarks of container ports using data envelopment analysis	International Journal of Shipping and Transport Logistics	Wu J and Liang L	2009
8	Planning Operations of Bulk Loading Terminals by Simulation	Journal of Waterway, Port, Coastal and Ocean Engineering	Wadhwa LC	1992
9	Agile service oriented shipping companies in the container terminal	Transport	Liu W, Xu H and Zhao X	2009
10	DEA models for identifying sensitive performance measures in container port evaluation	Maritime Economics and Logistics	Wu J, Yan H and Liu J	2010
11	A computable general equilibrium analysis of efficiency improvements at Japanese ports	Review of Urban and Regional Studies	Doi M, Tiwari P and Itoh H	2001
12	Seaport performance analysis using robust non-parametric efficiency estimators	Transportation Planning and Technology	Simoës P and Marques RC	2010
13	Groups in DEA based cross-evaluation: An application to Asian container ports	Maritime Policy and Management	Wu J, Yan H and Liu J	2009
14	Port evolution and performance in changing logistics environments	Maritime Economics and Logistics	Woo SH, Pettit S and Beresford AKC	2011
15	Multi-criteria and multivariate analysis for port performance evaluation	International Journal of Production Economics	Madeira Junior AG, Cardoso Junior MM, Belderrain MCN, Correia AR and Schwanz SH	2012

Table 1. Contd.

16	Performance based clustering for benchmarking of container ports: An application of DEA and cluster analysis technique	International Journal of Computational Intelligence Systems	Wu J, Liang L and Song M	2010
17	Analysis of the implementation process of a strategic management system: a case study of the Balanced Scorecard at the Port Authority of Valencia	Revista Espanola De Financiacion Y Contabilidad-Spanish Journal of Finance and Accounting	Caudeli JAA, Fillol AG and Ripoll Feliu VM	2009
18	Using data envelopment analysis to measure ports efficiency	International Journal of Business Performance Management	Abid C and Tadj L	2012
19	The impact of airport and seaport privatization on efficiency and performance: A review of the international evidence and implications for developing countries	Transport Policy	Gong SXH, Cullinane K and Firth M	2012
20	Port management performance and contextual variables: Which relationship? Methodological and empirical issues()	Research in Transportation Business & Management	Bergantino AS, Musso E and Porcelli F	2013
21	Seaport performance comparison using data envelopment analysis: The case of Iberian container terminals	International Journal of Business Performance Management	Dias JCQ, Azevedo SG, Ferreira JM and Palma SF	2012
22	Seaport network performance measurement in the context of global freight supply chains	Polish Maritime Research	Lam JSL and Song DW	2013
23	Environmental efficiency of ports: A Data Envelopment Analysis approach	Maritime Policy and Management	Chang YT	2013

Source: Research Data (2014).

After the synthesis of the results of the bibliometry as a result of the application of the tool ProKnow-C, the results of the systemic analysis are presented (Figure 3).

Result of the systemic analysis

From the lenses identified under the perspective of the researchers, there is a discussion about the critical analysis of the 23 articles of the BP.

Lens 1: Approach

The process of construction of knowledge in the decider, with the construction of the model of PE, the approach used is conditioned, what, according to Bell et al. (1988);

Bouyssou et al. (2000); Keeney and Raiffa (1976); Roy (1996); Dias and Tsoukiàs (2004), can be: (i) normativist; (ii) descriptivist; (iii) prescriptivist; or (iv) constructivist. The analysis of the articles of the BP evidences that the descriptivist analysis is predominant in the articles analysed. It appears that 15 articles present a prescriptive approach, five articles a descriptive approach and 3 items of normative nature. According to Roy (1993), the constructivist approach is more adequate to support decision for it incorporates the values and perceptions of the decider. However, none of the articles made use of such approach.

Lens 2: Context of the PE

The analysis of the articles of the BP evidences that the

Table 2. Theoretical affiliation of the lenses

Theoretical affiliation	Lenses	Definition of the lenses
Process of construction of knowledge in the decider...	1. Approach	Aims at the analysis of the approach used in the construction of the model PE, which can be normativist, descriptivist, prescriptivist or constructivist.
... within a specific context ...	2. Context of the PE	Aims at the analysis of the context in which PE is applied, that is, the focus/emphasis of the evaluation.
...throughtheidentification, organization, ...	3. Singularity	Aims at the analysis of whether the context of the PE is unique, i. e., specific of a reality and if it recognizes the decision-makers involved in the context.
... measurementand ...	4. Process of identification of the criteria of the PE.	Aims at the identification of the existence of a structured process for the identification of the evaluation criteria of the reality investigated and the participation of the decision-makers.
... integration of the aspects considered relevant to evidence performance ...	5. Measurement of the criteria	Aims at the identification of the kind of scale used for the measurement of the criteria, if it is ordinal or cardinal, and also observe the properties of the measurement theory.
... contemplating the generation of actions of improvement from the profile of performance obtained.	6. Integration of the criteria	The purpose is to check if the criteria are integrated by dimension and/or area of performance, allowing the evidence of the global profile (status quo).
	7. Process of performance management	The purpose is to identify if it contemplates a structured process of performance management, focusing on the identification of actions of improvement.

Source: Elaborated by the authors (2014).

Table 3. Characteristics of the articles of the BP

Characteristics of the Articles of the BP	Results
Most relevant journals of the BP	<i>Maritime Policy & Management</i> with four articles; <i>International Journal of Business Performance Management</i> with two articles, and <i>Maritime Economics and Logistics</i> , also with two articles.
Most relevant journals in the references of the BP	<i>Transportation Research</i> and <i>Maritime Economics & Logistics</i> with 41 and 26 citations, respectively.
Most relevant journals simultaneously in the BP and in the references of the BP	<i>Maritime Policy & Management</i> and <i>Maritime Economics and Logistics</i> .
Most cited article in Google Scholar	Application of a fuzzy multi-criteria decision-making model for shipping company performance evaluation (Chou TY and Liang G S), <i>Maritime Policy & Management</i> .
Most relevant authors in the BP	Wu J with four articles; Yan H; Liu L; and Liang L with two articles each.
Most relevant authors in the references of the BP	Cullinane K; Song DW; and Barros CP, with 48, 29 and 19 citations, respectively.
Methodology for performance evaluation most used in the articles of the BP	Data Envelopment Analysis – DEA, in its various versions, present in 11 articles.

Source: Elaborated by the authors, 2014.

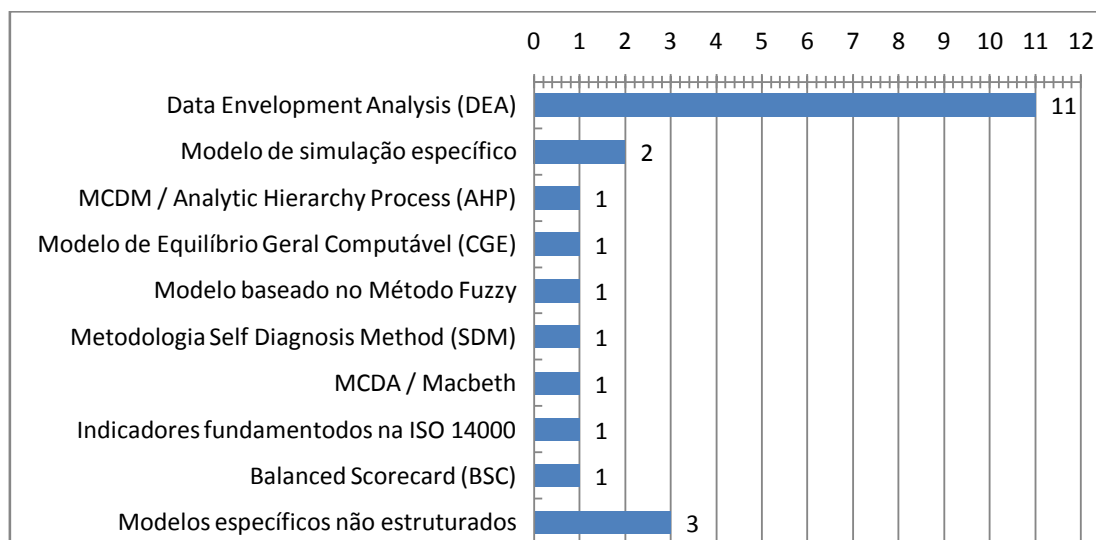


Figure 3. Results found in the BP. Source: Elaborated by the authors (2014).

Table 4. Focus of evaluation of seaport performance.

Focus of PE	Articles	Authors
Operational efficiency	14	Wu et al. (2009); Wu et al. (2010); Abid and Tadj (2012); Wu and Liang (2009); Bergantino et al. (2013); Dias et al. (2012); Al-Eraqi et al. (2008); Wu et al. (2010); Chang (2013); Simões and Marques (2010), Madeira et al. (2012); Doi et al. (2001); Wadhwa (1992); Turner (2000).
Environmental management	3	Darbra et al., (2004); Lun (2011); Saengsupavanich et al. (2009)
Global/strategic performance	3	Caudeli et al. (2009); Gong et al. (2012); Chou and Liang (2001).
Performance in a multi-faceted perspective	1	Woo et al. (2011)
Performance from stakeholders	1	Lamand (2013)
Seaportagility	1	Liu et al. (2009)

Source: Elaborated by the authors, 2014.

authors did not define a theoretical affiliation about the theme evaluation of seaport performance in order to carry out the research. It was verified, from the objectives of the researches, the emphasis assigned that points at restrictive or in-depth aspects about the theme in a macro-organizational and/or micro-organizational context. The grouping of the articles according to the area evaluation focus is presented in Table 4. It was verified in Table 4 that the majority of the articles focus on operational efficiency rather than on strategic and global performance of seaports. The researches on evaluation of environmental management evidence the growing concern of society as a whole with the environment and

organizational sustainability.

Lens 3: Singularity

The analysis of the articles of the BP evidences that singularity is observed, but it is not the most representative. Under this perspective, it was observed that 35% of the researches (Lun, 2011; Wadhwa, 1992; Saengsupavanich et al., 2009; Turner, 2000; Doi, Tiwari, and Itoh 2001; Chou and Liang 2001; Caudeli et al., 2009; Woo et al., 2011) recognize that the physical environment is unique and the PE model can only be

used with the organization for which it was built. This is a result of the specifications of each organization that need to be contemplated in the evaluation tools. Singularity is not present in 75% of the articles of the BP, thus characterizing the proposition of PE tools in the form of a generic framework that can be used in any context.

It was also checked if the deciders participated in the process of construction of the models of PE, i. e., if the perceptions and values of the deciders were taken into consideration. It was verified that 4 articles explicit the participation of the decider, whereas 19 articles do not evidence such participation explicitly.

It can be pointed out that the analysis according to the participation of the decider took into consideration his interaction, regardless if it took place throughout the whole process of construction of the PE model or only partly.

Lens 4: Process of identification of the criteria of PE

The critical analysis of the BP concerning the lens Process of Identification of the Criteria of PE aims at the identification of two dimensions, namely: (i) the use of a specific methodology that ensures a structured process for the choice of the criteria; (ii) the effective participation of the decider in this process.

The premise of the first dimension is that a structured process of identification of the criteria of the PE requires the use of tools/methodologies that are specific for evaluation, as shown in the Table 4.

It can be observed that the tool Data Envelopment Analysis (DEA) is the most used in the articles of the BP, whereas only 3 articles contemplate the identification of the criteria through the procedures defined by the authors.

The second dimension – effective participation of the decider in the process of identification of the criteria of PE – can be evidenced in three groupings: (i) when the criteria are informed and operationalized by the deciders (Caudeli et al., 2009; Madeira Junior et al., 2012), which contemplates 2 articles (9% of the BP); (ii) when the criteria are informed only by the deciders (Chou and Liang, 2001; Woo, Pettit, and Beresford 2011), which also contemplates 2 articles (9%) of the BP; (iii) when the criteria are informed exclusively by the researcher from secondary data, which contemplates 19 articles (82%) of the BP.

It was observed that only one article makes use of a methodology with a constructivist approach and in two articles the evaluation criteria are identified and operationalized by the decider. According to Roy (1993), it is important to reflect on the legitimacy of an evaluation model under the perspective of who is going to use it. If it is built with the effective participation of the decider, it will

be legitimate before the context evaluated, if it is built from external information, as for example, the use of literature, it will be valid if it is submitted to the approval of the decision-maker.

Lens 5: Measurement of the criteria

It aims at the identification of what kind of scale is used for the measurement of criteria, if it is ordinal or cardinal, along with the observation of the properties of the theory of measurement. The ordinal scale ranks the levels of performance, indicating the order of preference of the items associated to a criteria and allows for counting, frequency, mode and median operations (Chisnall, 1973), but it does not explain the attractiveness differences between the performance levels, which can be obtained with the use of a cardinal scale.

From the BP, it was verified that 14 articles (61%) of the BP present ordinal scales for the measurement of the levels of performance of the criteria, 2 articles (9%) present cardinal scales (Chou and Liang 2001; Madeira Junior et al. 2012), 2 articles (9%) present Likert scales (Liu et al., 2009; Woo et al., 2011) and 5 articles do not specify the kind of scale (Lam and Song, 2013; Saengsupavanich et al., 2009; Darbra et al., 2004; Doi et al., 2001; Gong et al., 2012).

The measurement scales, according to certain studies (Barzilai, 2001; Lacerda et al., 2014), must meet six priorities in order to have scientific recognition, which are: (i) measurability; (ii) operability; (iii) homogeneity; (iv) intelligibility; (v) distinction between the best and worst performances; and (vi) observation of the properties of ordinal scales. The analysis of the BP informs that only two articles meet such properties entirely (Chou and Liang 2001; Madeira Junior et al. 2012), whereas 16 articles partly contemplate some of the properties and 5 articles do not present the properties.

Lens 6: Integration of the criteria

It aims at the identification of the integration of the criteria by dimension and/or performance area, thus explicitly stating the global profile (status quo). The integration of the criteria in a local and/or global manner enables a systemic diagnosis of the current situation of performance and enables the creation of actions for improvement (Lacerda et al., 2014).

The analysis of the articles of the BP evidenced that Chou and Liang (2001) make use of the process AHP to transform ordinal scales into cardinal scales and thus reach the integration of the criteria; Madeira Junior et al. (2012) use ordinal scales through MCDA methodology, convert them into cardinal scales, present two reference

levels in each criterion (anchor levels) and with the application of substitution taxes obtain the integration of the criteria. Caudeli et al. (2009) analyze the integration of criteria through Balanced Scorecard (BSC) in the step of definition of the strategic maps of the organization, which precedes the measurement of performance of each criterion, i. e., the integration/alignment is the means for the definition of the criteria. The 11 studies that use the tool Data Envelopment Analysis – DEA – realize the integration with the use of quantitative ordinal scales with the use of mathematical functions and substitution taxes evidencing the local and global profile of operational efficiency. The studies of Liu et al. (2009) and Woo et al. (2011), from the use of ordinal scales of the Likert kind present an integration of performance by variables/dimensions evaluated, but not in a global manner. Also, 7 of the BP articles do not present a process of integration of the performance criteria.

The use of ordinal scales properly transformed into cardinal scales is recommended in the integration of the criteria, applying compensation taxes that will allow the identification of how much a certain criterion must be highlighted to compensate for the loss in performance in another criterion (trade-off). By doing so, one obtains the local and global performance of the context evaluated (Lacerda et al., 2014; Azevedo et al., 2013)

Lens 7: Process of performance management

Its purpose is to verify if it contemplates a structured process of performance management focusing on the identification of actions for improvement from the premise that the main objective of performance evaluation is to allow for the generation of actions for improvement from the obtained diagnosis (Lacerda et al., 2013).

The analysis of the articles of the BP indicates, from the considerations made in the previous section, that 14 studies present a performance profile (status quo), enabling a view of the diagnosis of the context evaluated. The performance profile (status quo) is the starting point for the identification of actions for improvement, since it evidences the strengths and weaknesses of the context evaluated. However, the absence of a group of procedures that help the decider to operationalize actions for improvement, mainly the ones that indicate the impact of each action in the improvement of global performance, becomes fundamental. From the 14 articles that present integration of the criteria and then generate a diagnosis of the context evaluated, no one gives details of a structured management process focusing on the identification and operationalization of actions for improvement. Madeira et al. (2012) made use of MCDA Methodology, which, in a conceptual manner, previews a step of recommendations for performance improvement,

but the study does not illustrate such step; Lun (2011) affirms that companies must make efforts to improve performance, but does not show how to do it; Wu and Liang (2009), after analyzing 77 seaports in the world, inform that the most efficient seaport must be considered benchmark for the inefficient ones to improve their performance, but does not illustrate how to obtain better performances; and Abid and Tadj (2012) affirm that the management of the inefficient seaport has to adopt methods and practices of an efficient one, but do not demonstrate how to do it.

It is concluded that the incorporation of actions for improvement with the ranking of the actions necessary value the process of performance evaluation, once it provides the basis for the decider, demonstrating how it should act in order to improve the performance of the context evaluated.

The authors of the current project share the concept that, if such improvement make the management effective, it must first allow for the construction of a model of evaluation that must come from a constructivist approach and provide cognitive tools that give room to the construction of knowledge in the decider. Such knowledge must then be improved with the use of quantitative tools that make performance evaluation precise, thus looking forward to ordering and prioritizing the actions of more impact (Lacerda et al., 2011).

Conclusion

The preliminary analysis of the Bibliographic Portfolio, composed of 23 scientifically relevant articles leads to the conclusion that: (i) the focus of evaluation of seaport performance has been on the operational efficiency rather than on strategic and macro organizational questions; (ii) the majority of the studies is dissociated to the reality lived by seaport managers, showing a certain distance of the researchers from the object of the research; (iii) the number of articles concerning evaluation of seaport performance is limited, considering the importance, contribution and impact of such industrial in local and global economy.

The systemic analysis of literature, which consisted in the critical comparison of the theoretical affiliation of performance evaluation with the Bibliographic Portfolio through the lenses of analysis (approach; context of the PE; singularity; process of identification of the PE criteria; and performance management process) evidenced several opportunities for future research from the standpoint of researchers and seaport managers.

The results, in a punctual manner, by lens analyzed, evidence that the major opportunities for research are related to lenses: (i) Approach of the PE, which requires the use of constructivism; (ii) Context of the PE, which

Table 5. Proposals for future researches.

Lenses analyzed	Challenges to researchers	Challenges to seaport managers
Approach	More interaction with seaport managers in order to identify their values and preferences The action of the researcher should be that of a facilitator in order to support and spot the choices of managers instead of prescribing what should be evaluated.	More involvement, including the dedication of time in the construction of systems of performance evaluation that contemplate the specifications and characteristics of seaport unites aligned to the objectives and preferences of the higher administration ranks.
Context of PE	More emphasis on the formulation of approaches and methodologies with strategic focus rather than operational; Development of tools that capture the synergies and contemplate the systemic and integrating dimensions of performance of the agents that act in seaport environment and influence the performance of a specific seaport.	Widening of the use of methodologies with a strategic focus or that ensure the alignment of the strategic, tactical and operational decision levels.
Singularity	Broadening of studies personalized to the reality of each seaport unit instead of generic frameworks that can be used in any context. The concern with singularity will enable the rescuing of strategic concerns in seaport management.	More adherence of systems of performance evaluation to the nature and characteristics of the management model used. Proactive action in the elaboration and adoption of systems of performance evaluation rather than models prescribed by external consultants.
Process of identification of the PE criteria	Focus on the development of more flexible procedures of identification of the PE criteria that enable a wider alignment of the criteria on the strategic, tactical and operational levels. It is recommended that such procedures are conceived and thus operationalized by seaport managers instead of researchers.	More involvement from all hierarchic levels in the operationalization of methodological procedures of identification of the PE criteria.
Measurement of the criteria	Widening of the researches that focus on the use of properties of Measurement Theory in the process of performance measurement. Studies about the application of cardinal scales that ensure the application of levels of attractiveness in the measurement of performance.	Prioritize quantitative scales for performance measurement rather than scales of the Likert kind or qualitative scales. More emphasis on the use of cardinal scales that ensure different attractiveness levels in performance measurement in each criterion based on the Measurement Theory.
Integration of the criteria	An investigative look for multicriteria indicators that allow the analysis of local performance (for each criterion and/or area of interest) and global performance incorporating substitution taxes as mechanisms to balance the degree of importance of each criterion. Incorporate studies about the analysis of the integrating dimension of the criteria in order to analyze the impact in the performance of cooperative and integrating practices where a determined organizational unit is not only focused on performance, but also how much and how it can help other units to improve their performances, then generating a more consistent global performance.	Incorporate concerns into management practices by adding performance and its systemic analysis instead of analysis divided by criterion/performance indicators that do not evidence collective effort and the synergies resulting from the collaboration of several activities and/or organizational units. Widen the focus of analysis in the characterization of the criteria that most contribute to global performance, allocating resources and efforts compatible with such contribution.

Table 5. Contd.

<p>Process of performance management</p>	<p>Development of structured processes that ensure the effective use of the results of performance as mechanisms for the continuous improvement in the organizational performance, preventing performance itself to be the end instead of a feedback process. The literature analyzed through the tools for performance evaluation evidenced that the challenge is to present the performance without any indication of how this performance can be improved.</p>	<p>Incorporation of the practices for performance evaluation of structured routines for the improvement of performance. The implementation of actions for improvement will be more successful when the tool for performance evaluation demonstrate “what must be done” and what performance gains can be obtained gradually under the lens of local and global performance.</p>
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Source: Elaborated by the authors, 2014.

requires a more strategic and systemic focus; (iii) Process of performance management, which requires structured procedures for the analysis and interventions in the weaknesses shown in the process of performance evaluation.

The results of the systemic analysis, in a global manner, evidenced that the challenges of the researchers and seaport managers must be guided: (i) on the search for higher integration, aiming at the identification of the necessities and objectives of the reality lived by managers in the evaluation of seaport performance; (ii) in the formulation of more flexible methodologies and approaches to performance evaluation to follow the constant changes in seaport performance; (iii) in the development of studies focused on specific seaport units due to the peculiarities and specifications of each seaport and the influence of the external environmental variables on seaport performance; (iv) for the realization of prospect studies indicating the performance in future scenarios of seaport performance rather than on studies based on already consolidated data.

For future studies, it is recommended (i) the proposition of models of evaluation of seaport performance focused on a constructivist approach; (ii) a search for a higher involvement of seaport managers in the formulation and application of methodologies and tools for the evaluation of seaport performance; (iii) more emphasis on performance evaluation as tools for support to seaport management at strategic level.

OPPORTUNITIES FOR FUTURE RESEARCHES

The systemic analysis of the BP composed of 23 scientifically relevant articles evidences gaps for future researches grounded on the theoretical affiliation adopted for the theme performance evaluation and on the lenses defined by the researchers. The gaps for future researches require action by the researchers and seaport managers. Researchers are challenged to widen the

horizons of scientific knowledge about the evaluation of seaport performance with the formulation of new approaches and methodologies that meet the changes required in the seaport industry. Managers are responsible for the improvement in the performance of seaport organizations through the creation of competitive advantages with added value to the clients, considering the complex context of seaport environment, where several agents interact, not always with converging objectives.

Table 5 presents proposals for future researches to researchers and to seaport managers from the lenses analyzed.

Globally speaking, the systemic analysis of the PE, object of this research, still evidences: (i) the need for a larger integration between researchers and seaport managers, aiming at the identification of the real necessities and objectives associated with evaluation of seaport performance; (ii) the formulation of more flexible methodologies and approaches to performance evaluation in order to follow the constant changes in the seaport industry, especially involving the integrating dimensions inherent to the diversity of agents that act in the seaport environment; (iii) the development of studies focused on specific seaport units due to the peculiarities and specifications of each seaport and the influence of the several external environmental variables in seaport performance; (iv) the realization of prospective studies indicating performance in future scenarios of seaport performance rather than in studies that are based on already consolidated data.

Conflict of Interests

The authors have not declared any conflict of interests.

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