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QUALIFICATION OF COMPANY PERFORMANCE IN MANDATORY ENVIRONMENTAL AUDIT REPORTS IN THE STATE OF RIO DE JANEIRO

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ABSTRACT

The search for sustainable development has transformed environmental policies around the world, including in Brazil, where compulsory environmental audits are found to assist the environmental agency in diagnosing compliance with legal conditions and the environmental licensing of companies. Although there are different methodologies for evaluating companies' environmental performance, none guarantees real environmental quality in their operations, calling into question the validity of the evaluations, whether for the lack of quantitative and qualitative analyses or even the lack of standardization of the evaluation methodologies of these directives. Thus, this study analyzed four environmental audit reports prepared according to INEA Guideline 056 (Revision 3) to identify relevant elements for the environmental performance evaluation process of companies in the maritime sector. We discovered good practices developed by ANTAQ to qualify the interaction of maritime units with the environment that have the potential to improve the environmental performance assessment process proposed by Guideline 056. Therefore, we conclude that the reports analyzed did not thoroughly discuss the environmental performance of the companies, and thus, we indicate the EPI-ANTAQ as the basis for the performance evaluations related to Guideline 056.

Keywords: INEA Directive DZ 056; ABNT Standard ISO 14001:2015; ANTAQ Environmental Performance Index.

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INTRODUCTION

The 1960s were an important milestone for environmental awareness when countries were warned to stop their economic growth due to the natural resource consumption model of the time, which was leading the planet to ecological collapse (Generino, 1998). In subsequent decades, several important documents emerged for the environmental cause, such as the Brundtland Report in 1987, which proposed an economic development aligned with environmental issues, despite the cost of changes needed to achieve this end; the Rio Declaration on Environment and Development in 1992, which updated the Stockholm Declaration with 27 principles, expanding the concept of sustainable development; and the 1997 Kyoto Protocol, which defined stricter commitments related to greenhouse gas emissions (Brandão, 2013).

Given the lack of commitment of the countries participating in the conferences, subsequent events in 2002 and 2012 sought to expand the paradigm of sustainable development, giving greater attention to social issues and the implementation of agreements made between nations. The Sustainable Development Goals (SDGs) were created as a result of the United Nations Conference on Sustainable Development (Rio + 20) in 2012 to supposedly guide global economic and social development (Brando, 2013).

Since the 1992 Rio de Janeiro Conference, the private sector has been changing its environmental approach, exchanging its traditional reactive stance for a more proactive and innovative one. As a legacy of this event, ideas about companies' self-control and self-regulation emerged, indicating a change in attitude (Brandão, 2013).

Within this context, the growing environmental awareness drives stakeholders' desire for products and companies that harmonize their activities with nature. In this sense, Lotti (2015) suggests that implementing Environmental Management Systems places companies in a context of continuous improvement in which they systematically seek to reduce the negative environmental impacts related to their production activities, such as waste generation and consumption of raw materials and energy. Investing in technologies to minimize these impacts appears in the economic field since it changes the conditions of competition among companies.

THEORETICAL FOUNDATION

Environmental management systems

The search of companies for ways to control the impacts of their actions on the environment requires the use of technologies capable of generating such results. To this end, it is necessary to implement a system of measures capable of grounding the decisions of managers, i.e., the incorporation of environmental performance indicators—measurable and easily monitored factors—to classify the quality of the relationship between the company and the environment (Campos & Melo, 2008). From this perspective, the authors suggest that, without monitoring environmental performance indicators, companies may not be managing such performance, making it impossible to achieve the continuous improvement required by the ABNT ISO 14000 series standards.

The ISO 14001 Standard has international validity and presents a proposal for conduct adequacy regarding the environment due to the growing global demand for companies that pollute less and consume fewer natural resources, seeking proximity to the precepts of sustainable development. The standard presents a series of requirements that guide the development of a system to manage all aspects of production that may interact with the environment.

Some requirements of the ABNT ISO 14001:2015 standard are the planning and execution of preventive and mitigating actions for possible environmental damage, the development of an environmental policy for the company, and the organization of documents concerning environmental control and related factors to promote an increasing improvement in the company's environmental performance.

The ABNT ISO 14001:2015 standard is auditable and of voluntary adherence, with the premise of complying and enforcing compliance with all legal and environmental requirements pertinent to its activities, including those applicable to third parties, such as service providers and suppliers. This scope of the EMS over the supply chain should be formalized in the company's business policy, in which it commits to providing evidence and records necessary to meet governance demands (Soares, 2017).

Campos and Melo (2008) bring together studies by several other authors on the identification and importance of environmental performance indicators as tools for assessing companies' performance, together with the guidelines contained in the ABNT Standard ISO 14031: "Environmental Management; Environmental Performance Evaluation; Guidelines." Based on these studies, the authors point to two classes of indicators, both distributed by the requirements of the ABNT ISO 14001 Standard: Management Performance Indicators (MPIs), related to the level of implementation of policies and programs, financial performance, and the relationship with the community, and Operational Performance Indicators (ODI), related to the materials used in production, energy consumption, services provided, and waste and emissions generated. Thus, operational indicators can be

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used to measure the environmental performance of companies because they are based on the inputs and outputs of the organization's physical facilities and equipment.

In this context, the environmental audit procedure is inserted into controlling and verifying the effectiveness of the EMS, ensuring its continuous improvement, and contributing to evaluating environmental risks, loss reduction, and pollution control (Generino, 1998). Therefore, an Environmental Management System (EMS) is considered deficient without periodic environmental audits since continuous improvement imposes the need for verifying and assessing the EMS periodically (Dutra & Oliveira, 2006).

Environmental audits

Environmental problems cross several productive sectors, ranging from the local to the global level, and consequently, generate tensions between such sectors and the public authorities. Thus, the expansion and consolidation of environmental audits worldwide impact environmental policies and business management policies (Brandão, 2013).

The adoption of environmental audits as a control tool arises from an evolution of the interests of private companies for greater market competitiveness under a preventive but flexible bias, enabling the minimization of production costs and environmental and occupational risks and the verification of their compliance with the legislation in force. However, despite this voluntary movement on the part of the private sector, major environmental accidents and the growing environmental awareness of society have driven the government to adopt the tool compulsorily. Environmental audits are also relevant in foreign trade since insurance companies and banks widely use them, contributing to the aforementioned scenario of competitiveness (Brandão, 2013).

In the field of private (voluntary) audits, we find in the ABNT ISO 14001:2015 standard three most common models: internal or first-party audits, in which the company appoints auditors within its staff to analyze its EMS and environmental performance; external audits, performed by an agent outside the organization to obtain information about the organization's environmental performance for contractual motivations, also characterized as second-party audits; and third-party audits, which represent environmental certification granted by an Accredited Certification Body (OCC) (Brandão, 2013).

According to Piva (2007), environmental audits are a powerful tool to mediate interactions between the economy and the environment by helping companies analyze their environmental performance and adapt to current legislation. Simultaneously, we have audits as a tool for acquiring and disposing information on interactions between business and nature, a right contemplated by the Federal Constitution of 1988. According to Padilha (2012), the financial issue must permeate the tools for achieving sustainable development, whether through the threat of penalties and fines for polluting companies or tax breaks for those who preserve the environment directly impacted.

Compulsory audits and the national scenario

It is no news that Brazil has a special place in the international environmental scene as it is home to the world's largest biodiversity and has very advanced legal instruments. Its representativeness expands to MERCOSUR countries since our country has adhered to several multilateral international treaties and agreements, some already mentioned in this paper, since the Stockholm Declaration in 1972 (Brandão, 2013).

Law 6.938/1981 of the National Environmental Policy (PNMA), as amended in 2013, presents the legal instruments to protect the environment and is implemented by agencies such as CONAMA (National Environmental Council) and IBAMA (Brazilian Institute of Environment and Renewable Natural Resources). The PNMA embodies several sustainable development principles influenced by international standards, such as the concept of polluter pays and prevention (Brando, 2013).

Along this line, Brandão (2013) shows that environmental audits are alternatives to circumvent the difficulties in fully implementing the sustainable development model in our country, presenting increasing diffusion among companies within the national territory to control potentially polluting or environmentally degrading activities.

Mandatory environmental audits are activities linked to the national environmental policy employed as a control instrument by the public authorities, countering the difficulty of Brazilian environmental agencies to supervise companies by making them verify their compliance with the demanding environmental legislation of our country. Meanwhile, private audits (whether certified or not) usually focus on developing environmental management systems to integrate environmental issues into the companies' daily lives (Padilha, 2012). Nevertheless, audits are extremely valuable for businesses committed to continuous improvement of their environmental performance because the procedure seeks to systematically evaluate their activities to identify potential risks and their adequacy to legislation (legal compliance) (Lotti, 2015).

Brandão (2013) also notes that compulsory (public) environmental audits have been following the procedural pat-

terns of voluntary (private sector) audits, showing a conceptual alignment between both concerning various aspects of the audit process, such as the preparation of reports and questions observed by auditors. However, these documents do not have a standardized format.

Environmental audits are critical as a management and environmental diagnosis tool. The accident with an oil leak in Guanabara Bay in the year 2000 catalyzed a shift in attitude toward their use, in which they began to act as a supervisory diagnosis of the companies' environmental situation. Environmental audits also have a special role in the adjustment to environmental legislation since they help companies with this adjustment, contributing to their financial health by saving thousands of Brazilian reais in fines (Dutra & Oliveira, 2006).

The aforementioned accident resulted in the creation of CONAMA Resolution 306/2002, which guides the minimum parameters for a mandatory audit in port facilities and most facilities participating in the oil production chain (Art. 1). Its Articles 3 and 4 (as amended by CONAMA Resolution 381/06) give general guidelines as to the format of the audits, exposing the need for the performance of systematically documented agreements involving the analysis of objective evidence to find the contrasts with the environmental legislation and documenting the non-conformities for later inclusion in the institution's action plan.

At the state level, INEA Guideline 056 Revision 3, approved by CONAMA Resolution No. 021 of May 7, 2010, based on the legal basis of the federal and state spheres, sought to regulate the conduct of mandatory environmental audits in the state of Rio de Janeiro. However, unlike CONAMA Resolution 306/02, which covers only industries in the oil and maritime industries, this guideline welcomes other classes of companies, as stated in Item 4.1 of the law.

Another important point in Guideline-056 is the obligation to carry out two types of environmental audits for the classes of companies listed in Item 4.1: control audits, carried out when applying for or renewing the environmental license, and follow-up audits, carried out annually to check the functioning of the audited unit's action plan.

According to Piva's (2007) study on Law 13.448/2002 of the State of Paraná, companies need to collaborate in the transparency of information to society, given the visible inefficiency of environmental regulations due to the total lack of enforcement. Conversely, the mandatory and periodic audits imposed by the legislation can act as a way to avoid exorbitant environmental fines by providing the opportunity to check and solve environmental faults before an inspection event, reducing costs and resulting in a more effective environmental control process.

Once again, Guideline DZ-056 provides specific details about various audit process steps, providing greater clarity about the information that is indeed relevant to the environmental agency. In Item 8, the document outlines the content of the audit. Item 9 outlines the minimum that must be included in the report. Item 10 regulates how the transfer and publication of the audit information should take place. Finally, its annex presents the environmental performance indicators that can be used in its audits.

Generino (1998) points out the generalist character of Guideline DZ-056, which can result in diverse audit programs with equally mixed results. In response to this, the author concludes that environmental agencies should develop more specific terms of reference for each type of company.

Environmental performance and its evaluation

The ABNT ISO 14031:2015 Standard guides an organization to continuously analyze its environmental performance over time without classifying and qualifying the degree of performance to generate inputs to assess whether its environmental management system can achieve the goals and objectives defined by top management based on its environmental performance criteria. Similarly to the ABNT ISO 14001:2015 standard, the ABNT ISO 14031:2015 standard uses the Plan-Do-Check-Act (PDCA) management model to prepare the Environmental Performance Analysis (EPA), highlighting the identification of Environmental Performance Indicators (EPI) as key elements for its implementation.

The standard also presents the Environmental Condition Indicators (ECI) to provide information on the environment's status, allowing verification and adjustment of actions to meet the desired or stipulated environmental quality levels. From a methodological standpoint, these indicators can be combined to represent better the complexity of certain environmental aspects identified by the organization, even if they derive from indicators already existing in common databases. It is worth noting that indicators measured by absolute values, such as the number of fines, were considered less appropriate for measuring environmental performance than indicators in percentage or index format since they express some relationship between parameters (Campos & Melo, 2008).

Under this paradigm, we understand the ADA proposed by the ABNT ISO 14031:2015 standard supports the design and continuous improvement of the organization's environmental management system, as it brings more details on what to do and identifies how to structure any harmonization attitude or posture between organization and environment. However, according to the ABNT ISO 14001:2015 Standard, certification does not guarantee improvement in

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the organization's environmental performance; its adoption reflects control to seek better performance levels by monitoring the activities' direction to achieve eco-efficiency (Vellani & Gomes, 2010).

According to Frank and Grothe-Senf (2006), no available instruments and methods for evaluating environmental performance allow for comparison between companies, i.e., methods that qualify or rank environmental performance based on global parameters. Thus, the authors show that companies are free to define how and which parameters are important, and the evaluation of environmental performance is based on the degree of achievement of the companies' objectives and targets and, therefore, cannot be compared to others. Another point of interest is that environmental audits are generally qualitative in their execution. However, it is possible to find works in the literature that bring methodologies of an analytical nature to environmental performance evaluation, such as those addressed by Padilha *et al*. (2012) and Roos (2016).

Faced with this problem, Frank and Grothe-Senf (2006) propose a model for evaluating environmental performance that seeks to verify the overall national and specific objectives of the companies that contemplate the precepts defined in international agreements to achieve sustainable development in a broad sense. However, this model does not generate a complete evaluation, indicating sustainability levels by following the path of analyzing the progression of the company's environmental performance over the years and seeking to measure organizations' efforts to achieve their environmental goals, similar to the proposal in Guideline DZ-056 R.3 (Frank & Grothe-Senf, 2006).

This model can play a pedagogical role by showing the sustainability management stages and the steps the organization needs to take to accomplish them, promoting continuous improvement. Based on the authors' work, it is possible to draw a link between enablers and EMS components, as well as results and environmental performance indicators, implying that the best results result from the best enablers. The authors also suggest that each productive sector has some enabler of greater relevance to obtaining the best results. However, this fact is not enough to characterize the environmental performance of organizations, especially multinational companies, since they present very different environmental performances compared to units of the same company in different countries. In this sense, Frank and Grothe-Senf (2006) point to the influence of factors external to the organizations concerning environmental performance, such as cultural aspects present in labor relations and environmental policy widely implemented in each country.

Another possible vision is that of performance truly linked to ecological factors. An eco-efficient system employs techniques that minimize the volume of materials consumed, the speed of extraction and consumption, and the toxicity related to products and production activities without abandoning the common flow, seeking to increase production and product quality with less waste by making use of the minimization and dematerialization concepts. An eco-efficient system, in turn, results in effective positive environmental gains, not only attempting to have zero impacts but also bringing ecological benefits from the production chain. In this way, it is concerned with closing production cycles by transforming waste into raw materials or nutrients for ecological systems (Canazaro, 2017).

Leal Jr. and Guimarães (2013) address the concept of the eco-efficiency index presented by the WBCSD (World Business Council for Sustainable Development), given that this index indicates its use in studies on the subject since it considers the relationship between economic gains and environmental influences. According to the authors, increased product value and reduced environmental impacts will result in increased eco-efficiency, motivating greater investigations into manufacturing processes to identify inefficiencies and failures and reduce waste. It should be clarified that the value for the product or service should not necessarily be a financial value, but a numerical value that represents it. The environmental impacts should follow a different line of reasoning. Thus, the authors do not recommend the use of values related to the financial factor related to environmental impacts, and it is possible to frame as value of environmental influences practically any environmental aspects proposed by the ABNT ISO 14031 standard (EPI or ECI) or by Guideline DZ056.

According to Roos (2016), it is important to note that the literature on the subject contains discussions regarding definitions of environmental performance and its relationship with economic performance, proposing appropriate indicators for such measurement.

Environmental management in ports

Leite *et al*. (2011) mention the role of environmental audits in the process of adjusting ports to the new industrial paradigm, verifying compliance with legal conditions and the plans and controls provided for by environmental licensing, and assisting the port in making decisions regarding the preventive and corrective measures to be performed in port operations. The authors list three factors as the main difficulties for the execution of environmental audits in the port industry: the absence of a model of an environmental management and control system to ensure compliance with the resolution, the absence of qualified auditors according to such a resolution, and the absence of ways to assess compliance (Leite *et al*., 2011).

Faced with the difficulties raised, Leite *et al*. (2011) conclude that the environmental managers of the ports interviewed have great concern about meeting the legal and environmental constraints since the audits of CONAMA 306/02 bring a paradigm shift for the sector, possibly mitigating socio-environmental conflicts in the coastal areas of the country. Complementing this, Roos (2016) indicates that port environmental management in our country is still at a very incipient stage since only 23 of the 37 active ports have an operating license, six ports are in the process of obtaining the license from the SEP or the environmental agency, and eight ports still do not have it, including the port of Santos, the largest in the country.

In this way, port environmental performance is subject to several nuances and can be characterized from very specific perspectives, such as the viewpoint of some stakeholders and the complexity of the port system. It is recommended that performance evaluations be based not only on a productivity perspective but also on technical aspects to complement each other. Concomitantly, their performance can be assessed under each service provider's global or individual scope, and these approaches are not mutually exclusive. In this sense, the environmental issue gains traction in port management as legislation becomes stricter, making it necessary to rethink the relationship between profitability and environmental quality. Therefore, the very idea of port performance becomes questionable (Roos, 2016).

Roos (2016) shows that several studies on environmental performance assessment in ports worldwide seek to draw parameters for comparison between port units, of which many performance assessment models are based on criteria from the ABNT ISO 14001 standards. These studies include indicators of environmental aspects considered most relevant for the port sector: waste, atmospheric emissions, energy, environmental audits, noise, effluents, and environmental policy. However, only two evaluation models consider environmental and economic criteria, with ANTAQ's proposal being of greater interest to us.

EPI is a port environmental management tool created by Resolution No. 2650/2012 and developed by the National Agency for Waterway Transport (ANTAQ) in partnership with the National University of Brasilia to measure the level of management of Brazilian ports. To this end, EPI uses the AHP (Analytic Hierarchy Process) method and employs 38 indicators distributed into four categories: economic-operational, sociological-cultural, physical-chemical, and biological-ecological, to facilitate the understanding of port environmental issues (Silva *et al*., 2018).

This index measures the degree of compliance with the environmental conformities of the country's ports through a qualitative questionnaire to be voluntarily answered by their respective managers, thus supporting the classification of the efficiency and quality of the port's management. This classification scores from 0 to 100. The scores above 75 indicate a high performance; from 50 to 75, medium performance; from 25 to 49, low performance; and below 25, a critical situation. The authors indicate an increase in the EPI of the 27 port units studied between 2012 and 2016. In 2016, about 52% of the studied ports were ranked at the medium level, around 30% of the units were at the low level, no port was at the critical level, and five ports were at the highest level (Silva *et al*., 2018).

EPI contributes to the environmental management of ports by directing managers toward legal compliance and improving the environmental performance of the port unit. However, its main goal is to identify the ability to implement an EMS at the port in question and may not reflect its environmental performance since no indicators are measured or verified, not even the effectiveness or efficiency of an EMS that is already under development, as well as the existence of any environmental impacts (Silva *et al*., 2018). Therefore, by failing to measure environmental aspects such as levels of pollutants discharged into water, this model hampers the quantification of environmental performance and needs to evolve to be used as a metric for this purpose (Roos, 2016; Silva *et al*., 2018).

Thus, Silva *et al*. (2018) point out that environmental performance is based on managers' responses, making it impossible to evaluate physical, financial, and environmental performance, let alone the factors influencing or explaining the environmental performance of ports in our country.

Roos (2016) interviewed the actors involved with the EPI. Within ANTAQ's proposal, EPI seeks to be detailed to meet the largest number of environmental compliance requirements by ports to stimulate greater environmental efficiency without depending exclusively on the environmental agency. Thus, EPI becomes strategic for public agencies related to the sector as it encourages implementing corrective actions and developing improvement plans. Nevertheless, it stimulates the incorporation of more modern environmental management techniques to include the port sector in the sustainable development paradigm. Soares (2017) showed how the EPI serves as a guide for environmental managers in the naval sector in the structuring of environmental aspects management relevant to the EMS, demonstrating the proximity and synergy with the reference criteria for INEA Guideline No. 056 R.3 because it selects some ANTAQ-proposed criteria to characterize environmental performance in naval production units (see **Chart 2**).

It is worth noting that the Ministry of Infrastructure has guidelines for implementing EPI with a model and methodology similar to ANTAQ's for other public agencies related

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to air and land transport. Under an analogous dynamic, the National Civil Aviation Agency (ANAC) is responsible for characterizing the environmental performance of airports, and the environmental performance of roads and railroads under concession is the responsibility of the National Land Transport Agency (ANTT) (Brazil, 2021).

To fill this gap, Roos (2016) proposes a series of quantifiable indicators related to ports' economic and financial aspects. As one of the results of her work, the author points to the incipient stage in which port environmental management is found in our country and presents a simpler model for immediate implementation and another, more complex model with more indicators for a more mature moment of port environmental management, in which the EMS is consolidated. The author does not present any adequate mathematical model for calculating the indicators in the cited work.

Furthermore, Ross (2016) points out that ANTAQ's model lacks a quantitative basis regarding costs and performance, leaving a vacuum to be filled by the literature since there is still no definition of a model to measure the economic and financial consequences of the environmental impact and effectiveness of the port's environmental management system.

METHODOLOGY

Bibliographic references on the environmental performance evaluation process of companies in the maritime industry were gathered to support the analysis of four environmental audit reports, according to the requirements of INEA's Guideline (056 Revision 3), in force since 2010 in the state of Rio de Janeiro. This guideline records the environmental performance evaluation using indicators in the audit report as one of its requirements, as expressed in Item 7.2.2.

The Environmental Audit Reports (EAR) selected are for the period 2018–2019, with one report of the control type (EARC) and the other three of the follow-up type (EARA). Different audit firms prepared each EAR, and all the audited firms are also different. They are classified as follows for this work:

Report A was the only EARC-type report. It refers to a maritime unit of the pier type with mooring points for passenger ships and warehouses for events in the city of Rio de Janeiro, RJ;

Report B is for a port-type maritime unit with onshore and offshore terminals, handling and storage of various types of cargo, and an area for mooring cargo ships located in the municipality of São João da Barra-RJ. This report was also prepared to meet the requirements of CONAMA Resolutions 306/02 and 381/06;

Report C refers to a port-type maritime unit. It performs logistical support activities in transporting and storing various cargoes and equipment, waste, and effluents from vessels. It is located in the municipality of São João da Barra-RJ;

Report D refers to a shipyard-type maritime unit. It performs maintenance and shipbuilding activities in general. It is located in the municipality of São Gonçalo, RJ.

After being selected, the reports were analyzed, focusing on the identification, characterization, and classification of environmental performance, and performance indicators were chosen for the respective analyses. The goal was to evaluate whether the information contained in the AARs complies with the environmental agency and the audited companies' needs for data and information to support academic studies and evaluate investors and other social actors interested in the environmental performance of companies because the audits are mandatory and the reports are public by force of law to ensure the right to information about the quality of the environment for our society.

Then, the conflicting points between the reports and the INEA-056 R.3 Guideline were analyzed according to the theoretical reference studied, proposing changes to the DZ-056 R.3 Guideline to improve the information on the companies' environmental performance described in the Environmental Audit Reports.

ANALYSIS AND DISCUSSION

The DZ-056 R.3 is quite comprehensive and generic in the minimum requirements that must comprise the performance evaluation and environmental management described in Item 8, granting autonomy to auditors and auditees to choose the environmental aspects consistent with each context, except for some specific conditions, such as Item 8.1.3, which deals with legal compliance, especially regarding environmental licensing.

One of the main obstacles to analyzing EARs was the lack of a standard format, as cited by several authors (Brandão, 2013; Padilha, 2012), since this hinders the search for information in the reports. DZ-056 R.3 itself stipulates the basic format and structure of reports; however, none of the EARs thoroughly examined presented the sequence of information described in the guideline, mixing information from different sections in many parts. Therefore, this review will assess the structure and arrangement of the information found in the four reports according to the sequence proposed by Item 9 of DZ-056 R.3, focusing on Items 9.1.4 and

9.2.3 (Evidence and evaluation of environmental performance) related to the control and follow-up audits, respectively. Regarding this issue, a possible alternative to better organizing the information in the reports would be to present a model as an annex to DZ-056 R.3 itself or even refuse to receive reports that do not follow the structure proposed by the guideline, according to Item 6.6.

In this work, we understand that control audits (Item 3.1.1) are more comprehensive and detailed procedures that will only sometimes occur since they are required during the environmental license renewal or every four years. The follow-up audits (Item 3.2.1) are simpler and less detailed than the previous ones. They are performed annually to verify the evolution of the selected environmental aspects (performance indicators), the progress in the compliance of eventual non-conformities detected, and the incorporation of the improvement opportunities pointed out in the previous audits. Both collaborate for the continuous improvement of the companies' environmental management systems.

The Introduction Section (Items 9.1.1 and 9.2.1) presents the same requirements for both environmental auditing modalities. Thus, there are few differences between the reports analyzed, except for differences in the amount of information presented, with some reports being more objective and others providing more information about the audited companies. The point of interest is that all the reports studied presented the "audit objectives" outlined in Item 5 of DZ-056 R.3 in the Introduction chapter, either as sub-chapters or within the body of the text. Indeed, Item 9 does not require this information to be presented in the reports, but the auditors' perception of including this information in the reports may suggest that it has value for the audit process itself, especially for the audited companies. The only exception is Report B, which presents this information as a requirement of CONAMA Resolution 306/02 since it is a hybrid report between this CONAMA Resolution and DZ-056 R.3.

The Audited Units Characteristics Section (Items 9.1.2 and 9.2.2) requires more detailed information for the control reports and only information about changes in the company's characteristics since the previous audit. The reports analyzed meet all the requirements of Items 9.1.2 and 9.2.2, except for the follow-up reports, which additionally provide extra information beyond that required only for the control reports, such as the enterprise's area and the size of green areas within its land, or extra information outside of what is required by DZ-056 R.3, such as information on the classification of the company's activities regarding their polluting potential. Again, Report B provides information regarding the requirements of Item 3 of Annex II of CONAMA Resolution 306/02.

As required by Item 9.1.3, only control reports must contain a section listing the legal documents related to the organization's environmental issues, such as licenses, permits, and authorizations. Only Report A complied with this requirement since it is the only one related to a control audit. These documents should be analyzed later as a requirement of Item 8.1.3b to design the section assessing the organization's environmental performance.

The section Evidence and Evaluation of Environmental Performance provide guidance on the minimum requirements to be assessed in each type of audit (control or monitoring). In this sense, Items 9.1.4 and 9.2.3 complement each other. The control audit should be deeper and more detailed, identifying the evidence as required by Item 8 of DZ-056 R.3. In contrast, the follow-up audit, being simpler, should analyze fewer requirements (not all the requirements of Item 8, but only those related to Item 9.2.3), identify new non-conformities, check the progress in implementing the improvement opportunities already identified, and finally perform the environmental performance evaluation based on the selected indicators.

The use of environmental performance indicators is a requirement of Item 7.2.2, which imposes the mandatory nature of using this technique to analyze performance and record the results in environmental audit reports. Item 9.2.3c is regulated by Item 9.1.4 and indicates that the performance evaluation shall present graphs, tables, and comments that help understand the information presented, exposing trends and directions of the organization regarding environmental issues. Furthermore, Item 7.2.3 defines that the assessment must consider information from the last five years, allowing an evaluation of changes in the organization's environmental performance.

Therefore, from the perspective of complementing the information resulting from the audits, it would be up to the control audit to identify the indicators relevant to the organization since this is where the environmental aspects relevant to its activities are identified, and then to carry out the next performance assessments annually as part of the follow-up audits following the control audit. Turning our attention to Item 6.1, we find the frequencies of performance of both audit modalities proposed by DZ-056 R.3, in which we have an interval of four years for control audits and annually for follow-up audits, closing the interval of data compilation that will be employed in environmental performance evaluations proposed by Item 7.2.3 (5 years).

Similarly to the Introduction Section, the Conclusion Section has the same requirements for both environmental auditing modalities (Items 9.1.5 and 9.2.4). In this section, the auditor must issue an opinion on the fulfillment of the action plan conceived in the previous audit, verify the level

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of compliance with the non-conformities and the suggested opportunities for improvement regarding the fulfillment of preventive and corrective measures, and finally, suggest new opportunities for improvement, in addition to presenting his assessment of the company's capacity for continuous improvement.

Finally, the last chapter of the report must present an Action Plan (Items 9.1.7 and 9.2.5) meeting the following requirements for the control audits: presentation in table format containing the non-conformities, identified opportunities for improvement, their evidence, requirements that generated the non-conformities, the preventive and corrective actions to be taken, the deadline for carrying them out, and the name of the person responsible for carrying out the actions. For the follow-up report, there is no guidance as to the presentation format; only that the status of nonconformities and opportunities for improvement identified in previous audits must be presented, and, most importantly, an action plan must also be presented listing the new nonconformities and opportunities for improvement, following the same details as Item 9.1.7 since it must be an update of this information. In this way, this section is thus a compilation of the audited company's outstanding issues, objectively presenting the tasks to be completed until the next audit and facilitating their identification by the agents who will resolve the outstanding issues and the inspection agents.

Chart 1 below summarizes the analysis of the content of interest for the environmental performance assessment arranged in the studied reports:

Given these factors, it was possible to realize that, although DZ-053 R.3 fits as a term of reference for environmental performance audits, the section in which performance should be described and characterized is generally not discussed in detail since few indicators were selected, contemplating only some of the requirements of Item 8.1 of the guideline. Thus, the lack of this information made the environmental performance section somewhat superficial by failing to address several relevant environmental aspects quantitatively, only sometimes meeting the guideline's requirements.

The robustness of this section is relevant for studies and evaluations by various stakeholders. For the environmental agency, it would evaluate the evolution of environmental aspects inherent to the companies' production processes. In the academic sphere, it would be the basis for various studies, such as the qualification of the ecological efficiency of the processes or the elaboration of environmental performance metrics, factors questioned in the reference literature for this work. For consumers, suppliers, and investors, it would facilitate their understanding of companies' environmental commitment by providing them with environmental data for analysis. Finally, for the companies themselves, it would improve their perception of the environmental impacts they cause by allowing them to act directly on the aspects with the worst indicators to increase their environmental performance and to verify and be able to demonstrate the progress they make regarding the environmental performance of the indicators chosen.

Thus, we understand that ANTAQ's EPI contributes well to DZ-056 R.3 since the former has well-defined indicators that reflect the most relevant environmental aspects of the port sector, according to the agency's vision. Even though ANTAQ's indicators are quantified by weights applied to self-declared information without any verification or checking, which is the main criticism of several authors, the inclusion of a well-defined system of indicators divided into classes, such as those described in Item 8.1 and the guideline's annex, would bring greater breadth and clarity to the companies' performance evaluation. Naturally, further studies are needed to define which environmental aspects and indicators would be most appropriate for each class of organizations described in Item 4.1 of DZ-056 R.3. However, ANTAQ's EPI can be considered a model for an in-depth conception of performance evaluation techniques to promote higher environmental quality in industrial production processes.

Nevertheless, the main factor that makes ANTAQ's IDA unviable as a metric for ports' environmental performance is that it is measured through a self-assessment instrument, which expresses voluntary responses from companies, directly influencing their environmental performance rating. In this aspect, we found a great advantage in using the information present in the CONAMA 306/02 and DZ-056 audit reports to support the IDA-ANTAQ measurement since it promotes a more thorough investigation of the relationship between the environment and the company, helping the company to improve its actual environmental performance. The regularity of these audits, provided by law (biennial for CONAMA 306 and annual for DZ-056), also brings another positive point: periodic quantitative monitoring oriented toward the continuous improvement of environmental quality.

In this context, the IDA-ANTAQ model may be employed as a methodology for environmental performance assessment within the scope of DZ-056 R.3 audits since the questionnaire previously answered by the port manager could be answered by the auditor based on the evidence collected in the field. Nonetheless, adjustments should be made to fully meet the requirements of Item 8.1 of the guideline, especially in the case of using this methodology to quantitatively indicate the environmental performance of companies in other categories provided for in Item 4.1. Another important point is the need for deeper studies to qualify the companies' environmental

	Report A	Report B	Report C	Report D	REQUIREMENT
Type	Control	Follow-up / CONAMA 306/02	Follow-up	Follow-up	9
SELECTED PERFORMANCE INDICATORS	Water consumption; energy consumption; compliance with operating license	Energy consumption; waste disposal; water consumption	Waste generation; waste disposal	Water consumption; energy consumption	7.2.2 and Annex
GRAPHS AND TABLES	Did not present	Graphics only	Graphics only	Graphics and tables	9.1.4
ENVIRONMENTAL PERFORMANCE EVALUATION	Did not debate the indicators	Difficulty in identifying the information	Did not present comments or opinions on the company's environmental performance; it was difficult to identify information	Evidence of legal compliance described generically; no evidence of this requirement was listed.	7.2.2
EVIDENCE ORGANIZATION	Followed the organization proposed by DZ-056	Presented different organization from that proposed by DZ-056	Presented different organization from that proposed by DZ-056	Followed the organization proposed by DZ-056	9.1.4
DESCRIPTION OF THE ANALYSIS METHODOLOGY	It was not possible to identify specific methodology	Relationship between environmental aspect and production (ISO 14031)	Analysis of the company's ability to meet environmental targets and objectives	Indicators monitoring report	Not a requirement
EVALUATION OR CHECK OF THE ENVIRONMENTAL LICENSE	Yes	Yes	Yes	Yes	5.3 and 8
CONCLUSION	Fully met	Partially met	Partially met	Partially met	9.1.5 and 9.2.4
ACTION PLAN	Met	Did not meet	Met	Met	9.1.7 and 9.2.5
NOTES	Presented succinct and objective information	Presented the information distributed throughout the report, hindering the analysis	Presented the information distributed throughout the report, hindering the analysis	Presented the information distributed throughout the report, hindering the analysis	Not applicable

Chart 1. Content of interest for the assessment of environmental performance within the scope of Guideline 056: Revision 3

Socio-cultural category		
GLOBAL INDICATORS	**SPECIFIC INDICATORS**	**RELATIONSHIP WITH DZ-056**
ENVIRONMENTAL EDUCATION	Promotion of environmental education actions	Item 8.1.2
PUBLIC HEALTH	Health promotion actions	Item 8.1.11
	Port health contingency plan	Item 8.1.13

Chart 2. Relationship between IDA-ANTAQ and DZ-056 R.3

Biological-ecological category		
GLOBAL INDICATORS	**SPECIFIC INDICATORS**	**RELATIONSHIP WITH DZ-056**
BIODIVERSITY	Fauna and Flora Monitoring	Not applicable
	Synanthropic Animals	Item 8.1.11
	Aquatic exotic or invasive species	Not applicable

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Chart 3. Relationship between IDA-ANTAQ and DZ-056 R.3

Physical-chemical category		
GLOBAL INDICATORS	**SPECIFIC INDICATORS**	**RELATIONSHIP WITH DZ-056**
WATER MONITORING	Environmental quality of the water body	Item 8.1.7
	Storm drainage	Item 8.1.7
	Actions for water reduction and reuse	Item 8.1.5
SOIL AND DREDGED MATERIAL MONITORING	Dredged area and disposal of dredged material	Item 8.1.10
	Environmental liabilities	Item 8.1.14
AIR AND NOISE MONITORING	Atmospheric pollutants (gases and particulates)	Item 8.18
	Noise pollution	Item 8.1.9
SOLID WASTE MANAGEMENT	Solid waste management	Item 8.1.10

Chart 4. Relationship between IDA-ANTAQ and DZ-056 R.3

Economic-operational category		
GLOBAL INDICATORS	**SPECIFIC INDICATORS**	**RELATIONSHIP WITH DZ-056**
ENVIRONMENTAL GOVERNANCE	Port Environmental Licensing	Item 8.1.3
	Quantity and quantification of professionals in the environmental center	Item 8.1.2
	Environmental training and qualification	Item 8.1.2
	Environmental auditing	Item 8.1.1
SAFETY	Oceanographic, hydrological, meteorological, and climatological data bank	Items 8.1.7, 8.1.8, 8.1.11, 8.1.12, 8.1.12, 8.1.14
	Risk Prevention and Emergency Response	Item 8.1.13
	Occurrence of environmental accidents	Item 8.1.13
MANAGEMENT OF PORT OPERATIONS	Actions to remove waste from ships	Item 8.1.4
	Container operations with dangerous products	Item 8.1.4
ENERGY MANAGEMENT	Energy consumption reduction	Item 8.1.5
	Generation of clean and renewable energy by the port	Item 8.1.5
	Energy supply for ships	Item 8.1.5
COSTS AND BENEFITS OF ENVIRONMENTAL ACTIONS	Internalization of environmental costs in the budget	Item 8.1.1
ENVIRONMENTAL AGENDA	Disclosure of environmental information from the port	Item 8.1.1
	Local environmental agenda	Item 8.1.1
	Institutional environmental agenda	Item 8.1.1
	Voluntary Certifications	Item 8.1.1
CONDOMINIUM MANAGEMENT OF THE ORGANIZED PORT	Control of environmental performance of leases and operators by the Port Authority	Item 8.1.1
	Environmental licensing of companies	Item 8.1.3
	Individual emergency plans for terminals	Item 8.1.13
	Environmental auditing of the terminals	Item 8.1.1
	Solid Waste Management Plans of the terminals	Item 8.1.10
	Voluntary certifications of the companies	Item 8.1.1
	Environmental education program at the terminals	Item 8.1.2

Chart 5. Relationship between IDA-ANTAQ and DZ-056 R.3

performance, an analysis that would measure the real impacts on the environment related to the companies' activities. The IDA-ANTAQ does not contemplate this aspect. However, it is questioned in the literature since the IDA measures the degree of compliance with the environmental objectives stipulated by ANTAQ and the maturity of the port's EMS, i.e., it understands environmental performance as the port's capacity to seek better harmonization levels with the environment.

The sooner the public environmental management instruments start talking to each other, taking advantage of the information generated from the terms of reference, the sooner we can reach better environmental quality related to the Brazilian productive sector.

CONCLUSION

This study identified the relevant elements for environmental performance evaluation guided by INEA's Guideline 056 (Revision 3) in four mandatory environmental audit reports, each prepared by different audit firms and referring to four audited companies. The analysis considered the number and types of environmental indicators chosen, the relevant environmental aspects selected, the clarity of the information provided, and the methodology employed.

The four reports presented information organization in a very distinct way, especially in the environmental performance evaluation section, which was discussed with little detail and with a reduced number of environmental indicators, hindering or even making impossible the monitoring of environmental aspects and relevant impacts in a broad way. None of the reports presented the methodology employed for the performance evaluation. Only Report B addressed the indicators suggested by ISO Standard 14031:2015 by relating environmental aspects with production parameters.

Lastly, we suggest that DZ-056 be improved by incorporating well-defined environmental indicators that represent Item 8.1, unfolded according to the peculiarities of each class of enterprises characterized by Item 4.1, since indicators are a requirement of Item 7.2.2 of the guideline. In this context, the indicators used by IDA-ANTAQ are aligned with DZ-056 and may serve as a basis for this purpose.

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