Verification of quality of an environmental impact statement through the application of the Lee and Colley analysis method

Qualidade de um estudo de impacto ambiental verificada por meio da aplicação do método de análise de Lee & Colley

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Virgínia Hamer Campagnaro
Universidade Federal de São Paulo, Campus Diadema
vhcampagnaro@hotmail.com
https://orcid.org/0000-0002-9680-2440

Luciana Aparecida Farias
Professora Doutora do Mestrado em Análise Ambiental Integrada
luciana.farias@unifesp.br
http://orcid.org/0000-0003-3343-3403

Giovano Candiani
Universidade Federal de São Paulo, Campus Diadema
gcandiani@unifesp.br
https://orcid.org/0000-0001-9896-4390

ABSTRACT

Projects, activities, or undertakings causing a significant environmental impact must be licensed through the Environmental Impact Assessment (EIA), which is linked to the presentation of the Environmental Impact Statement (EIS). One criticism of the EIA has been its low quality. The study aims to evaluate the quality of an Environmental Impact Statement by applying Lee and Colley evaluation method. From the application of this method, grade E was obtained for this EIA of the Campo Grande Logistics Center, characterizing it as unsatisfactory, with omissions and significant inadequate points. Lee and Colley's analysis presents a total of 73 analysis criteria, including four areas, 17 categories,

and 52 subcategories. From the 73 analytical items (criteria), 24 (about 33%) obtained grade D, 22 (30%) obtained grade E, and 6 (8%) received grade F. Thus, 71% of the items of the assessed EIA were considered inadequate. From this study, it was possible to show that the evaluated EIA does not present satisfactory quality, hampering the process of environmental licensing and decision-making about the socio-environmental viability of the project in question.

Keywords: environmental impact, environmental impact assessment, environmental impact statement, quality review.

RESUMO

Projetos, atividades e empreendimentos causadores de significativo impacto ambiental devem ser licenciados por meio da Avaliação de Impacto Ambiental (AIA), a qual encontra-se vinculada à apresentação do Estudo de Impacto Ambiental (EIA). Uma crítica em relação ao EIA tem sido sua baixa qualidade. O objetivo deste trabalho foi avaliar a qualidade de um estudo de impacto ambiental por meio da aplicação do método de análise de Lee & Colley. A partir da aplicação deste método foi obtida a nota E para este EIA do Centro Logístico Campo Grande, caracterizando-o como insatisfatório, possuindo omissões e pontos inadequados significativos. A análise de Lee & Colley apresenta ao todo 73 critérios de análise, incluindo 4 áreas, 17 categorias e 52 subcategorias. Deste total de 73 itens (critérios) analíticos, 24 (cerca de 33%) receberam nota D; 22 (30%) obtiveram nota E; e 6 (8%) tiveram nota F. Com isto, 71% dos itens do EIA avaliado foram considerados inadequados. A partir do presente trabalho foi possível evidenciar que o EIA avaliado não apresenta qualidade satisfatória, dificultando o processo de licenciamento ambiental e a tomada de decisão sobre a viabilidade socioambiental do empreendimento em questão.

***Palavras-chave**: impacto ambiental, avaliação de impacto ambiental, estudo de impacto ambiental, revisão da qualidade.*

1. INTRODUCTION

The Environmental Impact Assessment (EIA) is an instrument for the prior assessment of the socio-environmental impacts of undertakings, whose function is to support decision-making processes (Agra Filho, 2014). EIA was instituted in 1969 in the United States and disseminated worldwide, and currently, around 200 countries have incorporated it into their national legislation. It can be said that today EIA is universally used (Sánchez, 2013).

In Brazil, the EIA was implemented through Law nº 6.938/1981, which in art. 9 establishes the instruments of the National Environmental Policy, such as licensing and review of effective or potentially polluting activities (Attanasio Junior, 2015).

Resolution No. 1 of 1986 of the National Council for the Environment (CONAMA) instituted definitions, responsibilities, basic criteria, and general guidelines to use and implement EIA. The EIA consists of characterizing and valuing the significance of the socio-environmental impacts that can be caused by undertakings in the environment. Still, in this resolution, in art. 1st, environmental impact was defined as any change in the physical, chemical, and biological properties of the environment caused by any form of matter or energy resulting from human activities that directly or indirectly affect the health, safety, and well-being of the population, social and economic activities, biota, aesthetic and sanitary conditions of the environment and the quality of environmental resources (Brasil, 1986).

According to Agra Filha (2014), the Environmental Impact Statement (EIS) is a set of systematic activities that allows analyzing the significance of socio-environmental impacts, which is structured into the following components: diagnosis of the quality of the environment (current scenario and initial reference), the evolution of future environmental quality, without implementing a potentially polluting activity (prognosis of the current scenario), and prognosis of environmental quality, after the action of a polluting activity.

The EIS must have the following components: characterization of the project, environmental diagnosis — including the characterization of the physical, biological, and socioeconomic environment, analysis of the socio-environmental impacts of the project and its alternatives —, considering: identification of likely relevant impacts, forecast and measurement of impacts, valuation and interpretation of impacts, a proposition of mitigating and monitoring measures, and communication of the results obtained (Sánchez, 2013).

The institutionalization of the EIA in Brazil is still a challenge for application, highlighting crucial advances. Some deficiencies are measured, especially in the institutional scope and structuring of the operation (Agra Filho, 2014). Currently, ways to improve this environmental management instrument are being discussed.

One of the reported problems is related to the technical analysis of the EIS. According to Sánchez (2013), numerous Brazilian and international publications point to the problem of the quality of EIS, characterizing many deficiencies such as failures in the study of alternatives, in the delimitation of areas of influence, in the diagnosis of the physical, biotic and socioeconomic environments, in the identification, characterization, and analysis of impacts, mitigation of impacts and compensation of impacts, monitoring and environmental monitoring programs and the environmental impact report (Rima) (MPF, 2004).

Lee et al. (1999) define that a good EIS needs to present the appropriate findings and conclusions, helping the decision-making regarding the approval or not approval of a specific project, considering its socio-environmental impacts.

In this context, this study aimed to evaluate the quality of an EIS through a retrospective review, applying Lee and Colley's method (Review Package) of analysis based on the evaluation of the content of each of the main components of the EIS.

This study is justified by the fact that the theme of the quality of the EIS is a theme of interest to multiple actors, such as companies or proponents of the projects, environmental government agencies, environmental consulting companies that carry out environmental studies, the general public, and academic interested developing research, in addition to the fact that the results obtained from this study can help the technical evaluation of an EIS, contributing to the multidisciplinary teams of the environmental agencies responsible for the environmental licensing of projects to make decisions, and also constitute an activity of good practices regarding the evaluation of the EIS.

2. THEORETICAL REFERENCE

The problem with the EIS is related to the criticism in the literature regarding its quality, mentioning many shortcomings. Retrospective studies report the problem and are recurrent in national and international literature, persisting with great concern (Almeida et al., 2012; Almeida et al., 2014; Anifowose et al., 2016; Aung et al., 2018; Bond et al., 2018;

Caro-Gonzalez et al., 2021; Cetesb, 2014; Hickie & Wade, 1998; Nakwaya-Jacobus et al., 2021; Nita et al., 2022; Pinho et al., 2007; Tang et al., 2009).

In the national and international literature (Cremonez et al., 2014; Fernández et al., 2018; Lee et al., 1999; Pinho et al., 2007; Põder & Lukki, 2012; Ribeiro et al., 2019; Sánchez, 2013; Sandham et al., 2013; Sarmah et al., 2020), it is possible to observe different methods of analysis of the quality of the EIS, generally conducted based on evaluative criteria with attribution of grades/rates to the items that form the EIS. Most of these studies used the analysis procedures developed by Lee et al. (1999) and Glasson et al. (1999).

Many deficiencies in the analysis of the EIS were pointed out, such as the absence of locational and technological alternatives, very generic mitigation measures, superficial monitoring plans, lack of indicators, lack of adequate technical procedures to identify and predict impacts, omissions, and underestimated forecasts of impacts, inaccuracies of criteria for defining the affected area and area of influence, disregard for social processes, valuing beneficial impacts over adverse ones, identified as less important, biased EIS and incomplete description of impacts (Sánchez, 2013).

Brazil has few systematic studies on EIS samples, and it is more common to find studies reporting criticism of individual EIS (Sánchez, 2013). At the Federal Public Ministry (in Portuguese, Ministério Público Federal, MPF), authors who studied a sample of 80 EIS submitted to federal licensing identified an extensive list of problems, highlighting incomplete and superficial surveys in the environmental diagnosis, disconnection between the environmental diagnosis, the analysis of impacts and the mitigation proposals, lack of alternative proposals, problems in defining the areas of influence, failures in the diagnosis of the physical, biotic and anthropic environments, deficiencies in the identification, characterization, and analysis of impacts, inadequate proposals considering the mitigation and compensation of impacts, absence of environmental monitoring and follow-up programs, incomplete Rima and inappropriate language for public understanding and omissions of information (MPF, 2004).

Several EIS can be elaborated with quality. However, it is more difficult to find them described in the literature. Pointing out deficiencies is essential because it indicates ways to improve them; on the other hand, good quality EIS can contribute to disseminating good practices (Pinho et al., 2007).

There are different tools for analysis and evaluation of the quality of EIS, constituting a pre-established set of criteria and guidelines for evaluation guidance. These analytical tools

are based on checklists containing a list of central elements that must be present in an EIS, considering aspects of the form and content of the study (Pinho et al., 2007; Sánchez, 2013).

A classic work in the evaluation of an EIS is the analysis procedure developed based on the content of the study known as the Lee and Colley Review Package (Lee et al., 1999). In this methodology, for EIS analysis purposes, these are divided into four main areas: (i) description of the project and affected environment, (ii) identification and assessment of key impacts, (iii) consideration of alternatives and mitigation measures, and (iv) communication of results. Each area is subdivided into categories, which in turn are subdivided into subcategories, the latter with a greater degree of detail. This method still employs criteria for attributing a rate or grade to each subcategory, category, and area and an overall grade to the EIS. Grades range from A to F, with A being assigned to a specific criterion in which the task was well performed and no crucial tasks were incomplete, and F when a criterion is considered very unsatisfactory, with essential tasks performed improperly or left aside (Lee et al., 1999; Sánchez, 2013).

Another checklist widely used in the literature is the list developed by Glasson et al. (1999), organized into eight sections, each with items to be evaluated by grade (A – F). The sections are (i) project description, (ii) environment description, (iii) scoping, consultation, and identification of impacts, (iv) prediction and assessment of impacts, (v) alternatives, (vi) mitigation and monitoring, (vii) non-technical summary, and (viii) organization and presentation of information.

Further guidelines for EIS analysis were developed by the European Directorate-General for Environment, also based on a checklist and assignment of grades. The concepts are complete, acceptable, and inadequate. The U.S. Environmental Protection Agency (USEPA) also created concepts for assessing EIS, considering the following criteria: adequate, insufficient, and inadequate (Sánchez, 2013).

Sánchez (2013) reports that the application of checklists, scoring criteria, and other similar procedures helps the technical analysis of EIS but can also establish an EIS comparison method for research purposes. Some limitations regarding the use of checklists as an analysis tool are certain subjectivity in the analysis and attribution of the score for a given criterion. The non-inclusion of eventual environmental factors specific to a location, cognitive differences, and individual experiences can determine differences in the evaluations (Badr et al., 2011).

3. METHODOLOGY

3.1. Study area

Paranapiacaba is a district of Santo André (in São Paulo, Brazil) inserted in the Environmental Protection Macrozone. It is located in Serra do Mar, in an area of springs and an area of preserved Atlantic Forest. In addition to being a tourist region, it represents a key area of environmental conservation with three protection units: the Municipal Natural Park Springs of Paranapiacaba, the Alto da Serra de Paranapiacaba Biological Reserve, and the Serra do Mar State Park (Campagnaro et al., 2021; Figueiredo, 2011).

The district's origins are strictly related to the Santos-Jundiaí Railroad, inaugurated in 1867 by the São Paulo Railway Company. The current population of Paranapiacaba is heterogeneous, and its social situation is complex, formed by descendants of the railway families that have occupied the district since its foundation and families of fragile social situations coming from other places, an occupation more recent (Campagnaro et al., 2021).

Despite the improvement of the socioeconomic situation of the district after its purchase by Santo André in 2002, mainly due to the development of tourism, even today population has low income and a series of precariousness in health, education, and infrastructure (Colantuono & Cestaro, 2017).

3.2. The project – Campo Grande Logistic Center

The Campo Grande Logistic Center is a project currently under analysis for obtaining the Preliminary License by the Environmental Company of the State of São Paulo (in Portuguese, Companhia Ambiental do Estado de São Paulo, CETESB). Its proponent is the company Fazenda Campo Grande Empreendimentos e Participações Ltda., and the responsible by the EIS/Rima is Consultoria, Planejamento e Estudos Ambientais Ltda. (CPEA) (CPEA, 2017a).

The project refers to a condominium intended to house load redistribution activities, using the railroad and road adjacent to the property as means of transport. The area has three plots of land totaling 468 ha, located in the Campo Grande neighborhood, Paranapiacaba district, Santo André. Of the total area, 91 ha would be effectively occupied by the project (CPEA, 2017b).

The area of the Campo Grande Logistics Center is part of the Green Belt Biosphere Reserve of the City of São Paulo and the Area for the Protection and Recovery of Springs in the Hydrographic Basin of the Billings Reservoir. In the areas of influence and at a distance of 3 km from the limits of the directly affected area, there are the following environmental conservation units: Serra do Mar State Park, Municipal Natural Park Springs of Paranapiacaba, and Alto da Serra de Paranapiacaba Biological Reserve. The following protected areas are in the project's areas of influence: Natural Area Protected of Serra do Mar and Paranapiacaba (CPEA, 2017a).

The choice of the project for analysis is justified by its significant potential for causing socio-environmental impacts and its establishment in Paranapiacaba, a location with complex environmental characteristics, presenting important environmental weaknesses and a vocation with a strong tendency towards environmental conservation, ecotourism, and environmental education.

3.3. Lee and Colley Analysis Procedure (Review Package)

The method consists of a four-step assessment pyramid, starting at the base (subcategories) and rising to the top (general characteristics). A series of criteria are evaluated at each stage, receiving a grade from A to F (or "not applicable" - NA). The EIS with grade A is well done, and no important task is incomplete. The EIS with grade B is generally satisfactory and complete, with only minor omissions and a few inadequate points. The EIS with grade C is satisfactory, despite omissions or inappropriate points. The EIS with grade D contains satisfactory parts, but the whole is unsatisfactory due to crucial omissions or inappropriate points. The EIS with grade E is unsatisfactory, with significant omissions or inappropriate points. The EIS with grade F is very unsatisfactory, with important tasks performed poorly or left out.

Grades are assigned to each item of the subcategories, which, when evaluated together, constitute the category grade and are used to assign a grade to the corresponding review area, generating the final EIS grade represented by the general assessment. From the score of all criteria, it is possible to assign a general score to the study and observe which aspects are flawed and in need of improvement.

Below are the review areas, categories, and subcategories applied through Lee and Colley's analysis (Table 1).

Table 1. Analysis criteria of the Lee and Colley method *(Review Package)*.

1. Description of the project and the affected environment	2.4.3. Definition and justification of the evaluation parameters.
1.1. Project description	**2.5. Impact significance assessment**
1.1.1. Project objectives.	2.5.1. Significance of impact on the community and affected environment.
1.1.2. Project design and size.	2.5.2. Methods used.
1.1.3. Physical presence of the project in the environment.	2.5.3. Justification of standards, assumptions, and parameters used.
1.1.4. Nature of processes and production rate.	**3. Consideration of alternatives and mitigating measures**
1.1.5. Nature and quantity of raw materials.	**3.1. Alternatives**
1.2. Description of the place	3.1.1. Advantages and disadvantages of viable locational alternatives and justifications for the chosen one.
1.2.1. Area description and location.	3.1.2. Technological alternatives.
1.2.2. Description and location of land uses.	3.1.3. Selection of alternatives.
1.2.3. Duration of project phases.	**3.2. Scope and effectiveness of mitigation measures**
1.2.4. Number of workers and means of transport.	3.2.1. Mitigating measures for significant adverse impacts. Description and justification for residual impacts.
1.2.5. Means of transport and quantities of materials.	3.2.2. Consideration of design changes, compensation, alternative facilities, and control.
1.3. Waste	3.2.3. Effectiveness of measures.
1.3.1. Types and quantities.	3.3. Commitment to mitigation
1.3.2. Treatment and disposal.	3.3.1. Details of measurements.
1.3.3. Calculation method of generation estimate, possible uncertainties, and confidence limits.	3.3.2. Measurement monitoring and adjustment system.
1.4. Environment description	**4. Communication of results**
1.4.1. Indication of the affected environment.	**4.1. Layout**
1.4.2. Indirect influence area.	4.1.1. Introduction: the objectives of the project and the environmental assessment.
1.5. Baseline Conditions	4.1.2. Logical and organized presentation.
1.5.1. Description of important components, methods, and uncertainties.	4.1.3. Summary of chapters.
1.5.2. Existing data sources.	4.1.4. References.
1.5.3. Prognosis of the site without the development.	**4.2. Presentation**
2. Identification and assessment of key impacts	4.2.1. Comprehensible text for non-experts.
2.1. Definition of impacts	4.2.2. Definition of technical terms.
2.1.1. Types of impact (direct, indirect, secondary, cumulative, short, medium, and long term, permanent and temporary, positive, and negative).	4.2.3. Continuous and integrated text.
2.1.2. Effects of impacts and the interactions between them.	**4.3. Emphasis**
2.1.3. Impacts of abnormal situations.	4.3.1. Emphasis on significant impacts.
2.1.4. Impacts on the baseline (difference between future conditions with and without the project).	4.3.2. Impartiality of the text.
2.2. Identification of impacts	**4.4. Non-technical summary (RIMA)**
2.2.1. Methods used.	4.4.1. Non-technical language.
2.2.2. Justification for the use of methods.	4.4.2. Main study questions and a brief explanation of the reliability of the methods used.
2.3. Scope	
2.3.1. Participation of the general public and interest groups.	
2.3.2. Opinion collection methods.	
2.3.3. Detailed investigation of the principal impacts. Justification of areas not selected for the study.	
2.4. Prediction of impact magnitude	
2.4.1. Identification and justification of data, gaps, and uncertainties of the evaluation.	
2.4.2. Description and justification of the methods.	

Source: Elaborated by the authors, according to Lee et al. (1999).

4. RESULTS AND DISCUSSIONS

4.1. Socio-environmental impacts of the project

According to the EIS of the Campo Grande Logistic Center, the environmental aspects and components considered most relevant for the assessment of impacts were: (i) on the physical environment —air quality, noise levels, land topography, soil quality, surface, and underground water resources, (ii) in the biotic environment —vegetation cover, terrestrial fauna, aquatic biota, and legally protected areas, and (iii) in the socioeconomic environment —population and quality of life, employment and income, local and regional economy, use of soil and landscape, public equipment and services, sanitation infrastructure, road, and traffic infrastructure, public finance and cultural heritage.

Twenty-five socio-environmental impacts were identified. The main ones are: loss of vegetation cover (suppression of an area with about 91 ha of native vegetation); interference in protected areas (interventions are planned in Permanent Preservation Areas (PPA), with the suppression of native vegetation); interference in the terrestrial fauna (among the interferences, stands out the loss of individuals due to being run over or killed during the suppression of vegetation and implantation works, loss of habitat, disturbance, and stress due to noise and movement of machines); interferences in the aquatic biota (direct interferences in PPA for the implantation of crossings, as well as the alteration in the quality of the water must interfere in the aquatic biota); generation of jobs (direct and indirect jobs mainly associated with the operation phase of the enterprise); increased traffic on the road system (increased truck circulation on roads close to the project, especially on SP-122, Road from the Village of Paranapiacaba); and consolidation of the intermodal logistics vocation (the Campo Grande Logistic Center will provide better use of rail transport for general cargo, as part of the planning of the transport and logistics system of the São Paulo macro-metropolis).

The socio-environmental impacts considered of high significance were silting up of drainages and watercourses, loss of vegetation cover, interference with terrestrial fauna, loss of habitat for fauna, interference with aquatic biota, job creation (1.285 jobs), increased traffic and the risk of traffic accidents, and consolidation of the intermodal logistics vocation. Other socio-environmental impacts of high significance but which were not considered are changes in air quality, changes in surface water quality, changes in soil and groundwater

quality, interference in protected areas, fragmentation and loss of connectivity, generation of a nuisance to the neighborhood, and alteration of land use and landscape.

The mitigation of socio-environmental impacts will be conducted through the implementation of the following environmental programs: the program for the environmental control of works, the program for monitoring the quality of surface water, the program for monitoring the quality of soil and groundwater, the program for controlling the suppression of vegetation, the program for wild fauna scaring and rescue, the program for terrestrial fauna monitoring, the program for aquatic biota monitoring, the program for environmental compensation, the program for forest compensation, the program for flora monitoring, the program for social communication, education, and environmental awareness, the program for traffic control, the program for training and hiring of labor, the program to support tourism development in Paranapiacaba and the program for managing archaeological heritage.

4.2 *Lee and Colley* Analysis Method *(Review Package)*

From the application of the Lee and Colley Method of Analysis (Review Package), grade E was obtained for the EIS of the Campo Grande Logistic Center, characterizing it as unsatisfactory, having significant omissions, and inadequate points.

Table 2 presents the grades of the criteria measured in the analysis with corresponding colors. The Lee and Colley method has 73 analysis criteria, including four main areas (description of the project and the affected environment, identification and evaluation of key impacts, consideration of alternatives and mitigation measures, and communication of results), 17 categories, and 52 subcategories.

From 73 analytical items (criteria), 24 (33%) received grade D, 22 (30%) grade E, 6 (8%) grade F, 11 (15%) grade C, 7 (9,8%) grade B, 1 (1,4%) grade A, and 2 (2,8%) NA (not applicable).

Thus, 71% of the evaluated EIS-Rima items were considered inadequate, and 26.2% adequate, showing the low quality of the evaluated EIS.

Bertuola and Candiani (2018), applying this same method of analysis to an EIS in the energy sector with natural gas exploration planned to be implemented on the coast of São Paulo, reported that many criteria were considered inadequate.

Table 2. Result of the EIS quality analysis.

1. Description of the project and the affected environment	**1.1**	1.1.1
		1.1.2
		1.1.3
		1.1.4
		1.1.5
	1.2	1.2.1
		1.2.2
		1.2.3
		1.2.4
		1.2.5
	1.3	1.3.1
		1.3.2
		1.3.3
	1.4	1.4.1
		1.4.2
	1.5	1.5.1
		1.5.2
		1.5.3
2. Identification and assessment of key impacts	**2.1**	2.1.1
		2.1.2
		2.1.3
		2.1.4
	2.2	2.2.1
		2.2.2
	2.3	2.3.1
		2.3.2
		2.3.3
	2.4	2.4.1
		2.4.2
		2.4.3
	2.5	2.5.1
		2.5.2
		2.5.3
3. Consideration of alternatives and mitigating measures	**3.1**	3.1.1
		3.1.2
		3.1.3
	3.2	3.2.1
		3.2.2
		3.2.3
	3.3	3.3.1
		3.3.2
4. Communication of results	**4.1**	4.1.1
		4.1.2
		4.1.3
		4.1.4
	4.2	4.2.1
		4.2.2
		4.2.3
	4.3	4.3.1
		4.3.2
	4.4	4.4.1
		4.4.2

Legend						
A	**B**	**C**	**D**	**E**	**F**	**NA**

Source: Elaborated by the authors, according to Lee et al. (1999).

Regarding the four main analysis items/criteria (1. description of the project and the affected environment, 2. identification and assessment of key impacts, 3. consideration of alternatives and mitigating measures, and 4. communication of results), all were considered unsatisfactory.

Criteria 1 and 3 received grade E, while criteria 2 and 4 grade D. Corroborating this result, Veronez and Montaño (2017) showed that criterion 2 in EIS in the state of Espírito Santo was considered unsatisfactory. Studying the EIS quality of small power plants, Montaño et al. (2014) pointed out that criterion 4 was also considered unsatisfactory.

In summary, the grades/rates attributed to the quality of the evaluated EIS reflect a series of flaws found throughout the study, whose main points are presented below.

4.2.1 Description of the project, the local environment, and basic conditions

The objective of the project was not presented with clarity, sometimes being described as a place to offer sheds, patios, and infrastructure for logistics, sometimes explaining that such infrastructures were not subject to licensing, implying that the target of licensing would only be earthmoving and formation of plateaus. Other relevant factors are not addressed, such as the type and amount of cargo to be transported, how these yards and sheds would be built, and by whom. There is no map showing what the development would look like when finished or an evident drawing of its structures.

The raw materials that would be used for its construction and operation were not described. The generation of important waste was not estimated, such as civil construction waste, atmospheric pollution, noise pollution, and possible waste generated by wagons and trucks. There are no proposals to deal with such waste, and there is a surplus in the waste generated by earthworks that was also not considered. The methods for the estimates were not described.

The affected environments were indicated with clarity on the map. However, based on the data provided, it is possible to infer that more locations will be affected by the development, and which were not considered. For example, crucial highways in other municipalities are mentioned as access for trucks but are not considered in the maps. The Billings dam, supplied by rivers that originate in the region, is not on the map of the affected

environments. However, the quality of its waters was evaluated, demonstrating an incongruity between different parts of the EIS.

In the characterization of the affected environment, few primary data were used, mainly for the physical and socioeconomic environment, and some methodologies are not considered adequate. Some relevant studies on the region's biotic environment were left out, such as the characterization of the vegetation conducted by the municipality of Santo André. The Master Plan of Santo André was disregarded in the conception of the enterprise, and parts of the law were omitted in the text. The scenario without the implementation of the enterprise is not built satisfactorily, presenting only the negative impacts of the non-construction of the Campo Grande Logistic Center.

4.2.2 Identification and assessment of the main socio-environmental impacts

Many impacts foreseen in the construction of the Campo Grande Logistic Center were not addressed as expected, such as changes in air quality, climate, human beings, and cultural assets, while impacts of lesser magnitude are exhaustively discussed. Furthermore, there is no clear definition of impact in the EIS.

Some possible impacts were not raised, such as the increase in real estate speculation and effects on tourism in the Paranapiacaba region. The data used to estimate the magnitude of the impacts were not sufficient, and the methodologies were not coherent, varying for each impact and overestimating positive impacts. Many crucial impacts do not have any quantitative measure in their estimation. The determination of the significance of the impacts was not clarified, not using quality standards most of the time and not considering any value of society.

The methodology used in the opinion poll conducted with residents was considered inadequate. The "snowball" technique tends to assess similar opinions and not form a representative sample of the population as a whole. The question prepared for the interview also directs the responses, creating a possible bias in the research by presenting positive aspects about the enterprise to the interviewee who does not know about it and, right after, asking their opinion.

4.2.3 Alternatives and mitigation

Alternatives for the location were only considered within the plots of land that constitute the project, with no studies showing that that region was the most suitable for the project, and some of the observed alternatives did not consider the legislation.

No alternatives were presented in the selection of technologies used, and they were neither mentioned nor described. Only technological alternatives for sewage disposal are evaluated.

The mitigation measures were briefly described without technical details. The effectiveness of the measures that will be applied has not been evaluated, with no data or studies showing that they will be sufficient to mitigate substantially the negative impacts. There is also no commitment to apply these measures, and the follow-up of impact mitigation programs is always "proposed" and "recommended." In the environmental monitoring measures during operation, air quality will not be monitored, which could suffer a significant impact due to the high circulation of trucks in the whole region.

4.2.4 Communication of results

The images and maps are of low quality. They do not show basic items, such as scale, north, and geographic coordinates. Besides, any image shows how the project should look when finished. In the images, there are no actual representations of the surrounding environment, such as the presence of the Atlantic Forest or even the district of Paranapiacaba. The arrangement of information in the EIS is unclear, with no summaries of chapters or highlighting of essential information, which is scattered throughout the text, often in chapters on other topics. Information is available only in attachments, which are not numbered and are difficult to access.

Rima reflects the lack of clarity of the EIS, repeating much of its information in an unclear way and not adapting to the general public. It presents technical terms without explaining what they mean, has few images and resources to facilitate understanding and reading, in addition not make clear some essential information, such as the fact that the licensing only provides for earthworks, and the patios and sheds will be under the responsibility of future companies interested in the environmental licensing of these implantations.

In general, the project was presented superficially, with crucial gaps, and it was not possible to realistically conceive its result and potential socio-environmental impacts. The low quality of the EIS has considerable importance in the process, both in decision-making regarding licensing by the environmental agency (which is hampered by the lack of quality information about the project, how it will work, and its real environmental and social impacts) and in forming a public opinion (which has difficulty to understand the project and its consequences).

When considering the ethical principles for public participation proposed by Hourdequin et al. (2012), two principles were affected by the quality of the EIS: the principle of equal access to information, since both the environmental agency and the public have difficulty accessing quality data about the project and its potential impacts on the region, as well as understanding the consequences of the decisions themselves; and the principle of genuine deliberation, since the lack of adequate information undermines the depth with which the subject should be treated.

The low quality of the EIS also harms the proponent since the need for additional studies and the legal processes generated increase costs and delay the result of the process, and may even lead to its annulment since the documentation necessary for approval of the license has a period of validity, and the license itself has a period to be granted within the process (Bronz, 2016).

5. FINAL CONSIDERATIOS

From the present study, it was possible to conclude that the EIA of the Campo Grande Logistic Center does not present satisfactory quality for the analysis of future scenarios and weighted decisions, which impairs public participation and the quality of the EIA process as a whole.

Environmental licensing is an important tool for planning and preventing socio-environmental impacts, but a poor quality EIS undermines the entire mechanism, demonstrating the importance of applying a method of analyzing the quality of the EIS, which can contribute to the improvement of these, mainly concerning the characterization and evaluation of socio-environmental impacts, considering their significance and magnitude.

It is noteworthy that the technical team responsible for carrying out the EIS of the project concluded that it presents environmental viability. However, this is conditioned to the implementation of the proposed environmental programs for control, mitigation, and environmental compensation of the negative socio-environmental impacts foreseen with the implementation of the project.

It should be noted that the EIS in this study was considered inadequate, which may hinder its approval by the environmental agency responsible for the environmental licensing of the project.

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