LICENSING AND ENFORCEMENTIN MUNICIPAL ENVIRONMENTAL DEPARTMENTS IN THE STATE OF RIO GRANDE DO SUL, BRAZIL

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Resumo

Licenciamento e fiscalização em departamentos de meio ambiente municipais no estado do Rio Grande do Sul, Brasil. Esta pesquisa avaliou os departamentos de meio ambiente de alguns municípios gaúchos quanto a sua estrutura e processos de licenciamento e fiscalização. As informações foram coletadas por meio de questionários online enviados aos municípios. Os questionários abordaram o quadro funcional, a capacitação do corpo técnico e a estrutura de trabalho dos departamentos de meio ambiente dos municípios. Foram efetuadas avaliações e classificações pela técnica da árvore de classificação, a partir dos dados municipais sobre as licenças ambientais emitidas e, adicionalmente, os autos de infrações lavrados como variáveis respostas. Assim, observou-se que os recursos humanos, servidores efetivos e a composição da equipe de trabalho são as variáveis que melhor explicam o comportamento da emissão de licenças ambientais municipais e, em partes, os autos de infração. A outra variável que mais satisfatoriamente explica a emissão dos autos de infração nos municípios é a utilização de website próprio com software ambiental nos departamentos de meio ambiente.
Palavras-chave: gestão ambiental; árvore de classificação; legislação ambiental.

Abstract

This study evaluated the environmental departments of some municipalities in Rio Grande do Sul, Brazil, regarding their structure and licensing and enforcement processes. Information was collected through online questionnaires sent to municipalities. The questionnaires addressed the staff, the training of the technical staff and the work structure of the environmental departments in the municipalities. Evaluations and classifications were conducted using the classification tree technique based on municipal data on the environmental licenses issued, and additionally the infraction notices issued as response variables. Thus, it was observed that human resources, effective civil servants and the work team composition are the variables that best explain the issuance behavior of the municipal environmental licenses, and in parts the infraction notices. The other variable that most satisfactorily explains the issuance of infraction notices in the municipalities is the use of their own website with environmental software in the environment departments.
Keywords: environmental management; classification tree; environmental legislation.

INTRODUCTION

The National Environmental Policy (*Política Nacional do Meio Ambiente – PNMA*) instituted by Federal Law no. 6938/1981, created the National Environment System (*Sistema Nacional de Meio Ambiente – SISNAMA*), which is composed of the different federal entities that are responsible for improving and protecting environmental quality, with the bodies in charge of municipal environmental management being part of this system, the so-called local bodies. The Federal Constitution of 1988 is responsible for establishing the municipal public entity as a federated entity, granting autonomy to the municipalities, enabling the initiation of the decentralization process of environmental management.

According to Wu *et al*. (2020), decentralization plays an important hole promoting environmental development. Therefore, in carrying out this function, it is up to municipal administrations to structure themselves to implement and improve their own environmental control system, which involves legal, institutional, technical and operational aspects in order to meet the requirements of efficient action in environmental matters. In this context, the state of Rio Grande do Sul has a decentralization policy in the area of environmental management with several programs for implementation, such as the Integrated Environmental Management System (*Sistema Integrado de Gestão Ambiental - SIGA/RS*).

Some studies seek to evaluate the phenomenon of municipalization of environmental licensing, but research and publications mostly prioritize "case studies"; therefore, few authors have addressed the integration between regulatory frameworks and implementing licensing in various municipalities and states. Thus, there is a need to use new parameters to measure municipal public policies and their environmental management, and

evaluating them with qualitative and/or quantitative parameters (BLAZINA *et al*., 2003; NASCIMENTO *et al*., 2020). There are also propositions of recommendations for future studies of investigations into municipal environmental licensing and its structuring, considering the reality of budget cuts (NASCIMENTO; FONSECA, 2017).

Rio Grande do Sul applied the decentralization policy of environmental licensing through the Integrated System of Environmental Management (*SIGA/RS*) of the Secretariat for the Environment by granting delegation of competence to the municipalities for those activities whose impact is local. However, considering the role of Complementary Law no. 140/2011 and the environmental code of the state of Rio Grande do Sul, which is more restrictive in terms of structuring the competent environmental agency, there was a clash that resulted in the end of *SIGA/RS*. However, the impacts of this action on municipal environmental licensing in Rio Grande do Sul are not known and the consequences of ending the *SIGA/RS* program were not evaluated (BURMANN, 2012).

In this context, the present work sought to answer the following questions: What are the functioning dynamics of the environmental departments of some municipalities in Rio Grande do Sul in relation to the licensing and enforcement carried out? Is there some relationship in these municipalities between the issuance of infraction notices and the department structure?

MATERIAL AND METHODS

Study Area

This study was conducted within the scope of the State of Rio Grande do Sul, in municipalities qualified for environmental management in accordance with Complementary Law no.140/2011. The 497 municipalities in Rio Grande do Sul are grouped into 27 associations of municipalities; these associations are responsible for purchasing products and services from public consortia, procuring resources for municipalities and for defending the municipality.

Data Collection

Municipal servants from the environmental departments of the municipalities were the target audience of this study. Data collection was conducted through a structured questionnaire with fixed alternatives through a survey method by e-mail with a direct approach. The use of this methodology is justified due to the low cost, the delivery speed of the questionnaires, and also the decrease in the potential bias of the interviewer (MALHOTRA, 2012). Respondents to the questionnaires were guaranteed anonymity and the database was treated in an aggregate manner, without the possibility of individual identification.

A pilot study was carried out to define the questionnaire to be applied throughout the state, with the application in the municipalities which compose the Association of Municipalities of Campos de Cima da Serra (*Associação dos Municípios dos Campos de Cima da Serra – AMUCSER*). Conducting the pilot study enabled filtering the questionnaire, reducing the number of questions for the final questionnaire, which was then applied in the second phase of this study to the other municipalities in Rio Grande do Sul. A total of 8 responses were obtained in the first study stage performed in municipalities belonging to the Campos de Cima da Serra region, which is equivalent to approximately 38% of the sampled population of employees of municipal environmental agencies and represents 8 municipalities of *AMUCSER*. Then 44 responses were obtained in the second stage with the remaining 487 municipalities in Rio Grande do Sul, considering that the study was conducted in the middle of the pandemic period and that some associations of municipalities were not receptive to the study.

The questions were multiple choice, open and closed, aiming to adjust the questions in accordance with the understanding of the interviewees. The online characterization questionnaires of municipal environmental agencies aimed to evaluate the licensing dynamics of activities with local impact and their inspection. Quantitative open questions were added to the multiple-choice questions, according to the methodology described by Abreu (2017). The digital platforms used in the questionnaires were Google Forms for the pilot study, and Microsoft Forms in the second stage.

The questions in these questionnaires were designed to estimate the staff functions and the structure of the environment departments. The number of professionals and the multidisciplinary team were also evaluated according to Complementary Law No. 140/2011, which are linked to the environmental departments of the municipalities, and if they are compatible with the demands of licensing and environmental inspection of municipal competence. The Likert scale was used in the questionnaires, adapted by Almeida (2015), to measure the degree of agreement, degree of frequency, degree of importance in relation to the questions and the ordinal scale within the functional framework (Table 1).

Table 1. Scale of degrees of agreement, frequency, importance.
Tabela 1. Escala dos graus de concordância, frequência, importância

Degree of agreement	Degree of frequency	Degree of importance
Totally disagree	It sometimes occurs	Totally unimportant
Disagree	Frequently occurs	Of some importance
Neither disagree nor agree	Always occurs	Extremely important
Agree	Rarely occurs	Little important
Totally agree	Never occurs	Very important

Data analysis

The completed questionnaires were evaluated and those which met the study criterion were classified through a screening process as valid, which also meant completing the Informed Consent Form. Only this criterion was adopted to minimize the loss of data from the completed questionnaires. The data obtained from the questionnaires were initially evaluated using descriptive statistics.

The data were subsequently analyzed using the classification tree methodology, one of the data selection techniques employed to categorize data, as this is an appropriate method when the objective is to classify data or predict an output (ARRAES *et al*., 2019). The use of this technique allows a choice when seeking to generate rules that can be easily understood, explained and translated (LEMOS *et al.,* 2005).

The analyzes for the classification trees were performed in the R Software program (R Core Team, 2018). However, more than one tree model was tested in the data selection considering that several questions were applied, generating a large amount of data for processing. Data in the selection were classified into two categories: explanatory variables and response variables.

The following explanatory variables were initially considered: Professional, Function, Time, Relationship, Perception of the professionals interviewed, Structure of the Department of Environment, Human Resources, Environmental Council, Environmental Legislation and its obstacles, Cooperation between state agencies and municipalities, Cooperation of the Association of Municipalities and Municipalities, and licensing and inspection forms. The response variables considered were: Licensing and quantitative inspection of the year 2019, according to the acronyms presented in Table 2.

Table 2. Acronym summaries used in the evaluation of licenses and infraction notices issued by municipalities in Rio Grande do Sul in 2019.
Tabela 2. Siglas utilizadas na avaliação das licenças e autos de infração emitidos por municípios gaúchos em 2019.

	What is the number of licenses issued during the year 2019?	What is the number of infraction notices issued during the year 2019?
Issuance interval for licenses and infraction notices	0-50	3-10
	51-100	11-20
	101-150	21-30
	151-200	41-50
	More than 250	More than 50

It should be noted that it was decided to request data regarding the number of licensing and infraction notices for the year 2019 due to the difficulty in obtaining answers through online questionnaires. In addition, the difficulty of servers to provide a series of temporal licenses and notice of infractions issued in previous years was also considered, as it would take time to search their databases and consequently low adherence to the study.

RESULTS

The results for the analysis of the factors that influenced the issuance of environmental licenses by municipalities in Rio Grande do Sul are presented in Figure 1.
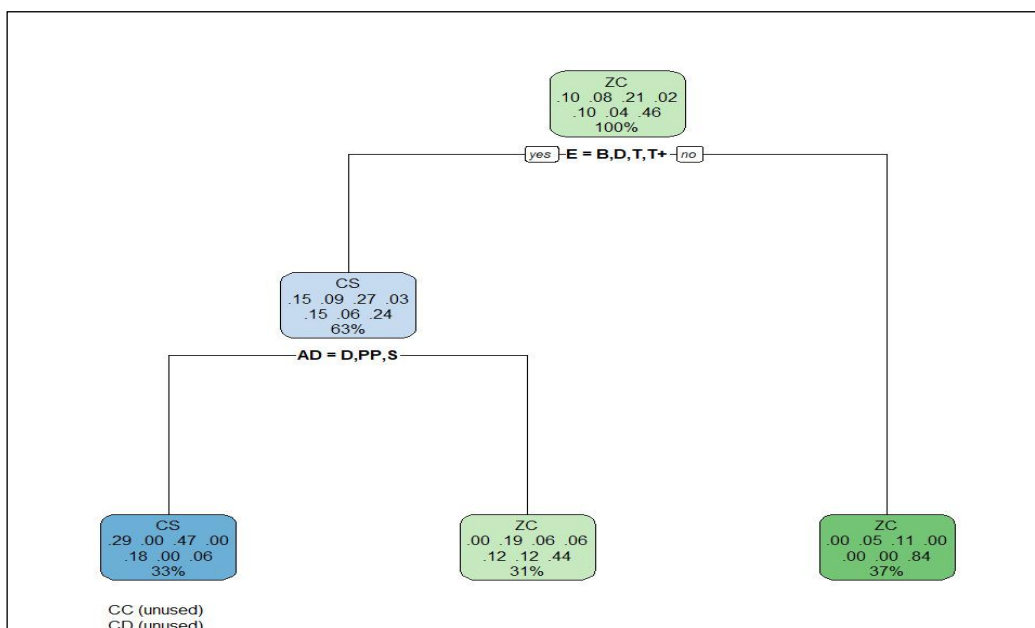
In which: ZC (0-50 licenses issued in 2019); CS (51-100 licenses issued in 2019); CC (101-150); CD (150-200); E (how many permanent employees work in the environment department?), B (blank), D (two), T (three), T+ (more than 3); AD (perception of issues classifying the degree of importance for the environmental inspection process), D (environmental legislation makes it difficult to prepare the infraction notice), PP (environmental legislation not very protective for the inspector), S (environmental legislation is sufficient).

Figure 1. Classification tree for the number of licenses issued in 2019 with the factors that influence the number of licenses issued by the municipalities of the Rio Grande do Sul.

Figura 1. Árvore de classificação para o número de emissões de licenças ano 2019, com os fatores que influenciam no número de emissão de licenças pelos municípios do Rio Grande do Sul.

   The best variable which explains the number of licenses issued is the number of effective civil servants working in the environmental department of the municipalities (E), with 84% of those who issued up to 50 licenses having a staff between 0 and 1 effective civil servant. The different answers for effective civil servants in the caption classification: from B (blank), D (two), T (three), T+ (more than 3), meaning one (U) or none (Z) of the permanent employees, represent (84% of the samples), which corresponds to 0-50 licenses issued. Within this same group, 11% of the samples had 51-100 licenses and 5% of the samples had 151-200 licenses issued. For the absence of response for the variable and the groups with two, three and more than three permanent employees, 24% issued up to 50 licenses and 27% between 51 and 100 licenses, showing that more than half of the evaluated municipalities issued up to 100 licenses in 2019.

   A second variable in this classification tree, namely the degree of importance for the environmental inspection process, helped to predict the number of licenses issued. The responses for this variable of it being difficult to prepare the infraction notice, little protection for the inspector, and sufficient represented 47% of the samples of 51-100 licenses issued in 2019. The blank or unanswered responses and gaps in some definitions represented 44% of samples from 0-50 issued licenses. However, the classification tree was not efficient in predicting the number of licenses greater than 100 or Unidentified response.

   In the assessment of the infraction notices issued by the municipalities of Rio Grande do Sul in 2019, the main explanatory variables found were: Professional, Function, Time, Employment link/type, Perception of the interviewed professionals, Structure of the Department of Environment, Human Resources, Environment Council, Environmental Legislation and its obstacles, Cooperation between state agencies and municipalities, Cooperation of the Association of Municipalities and Municipalities, and licensing and inspection forms (Figure 2).
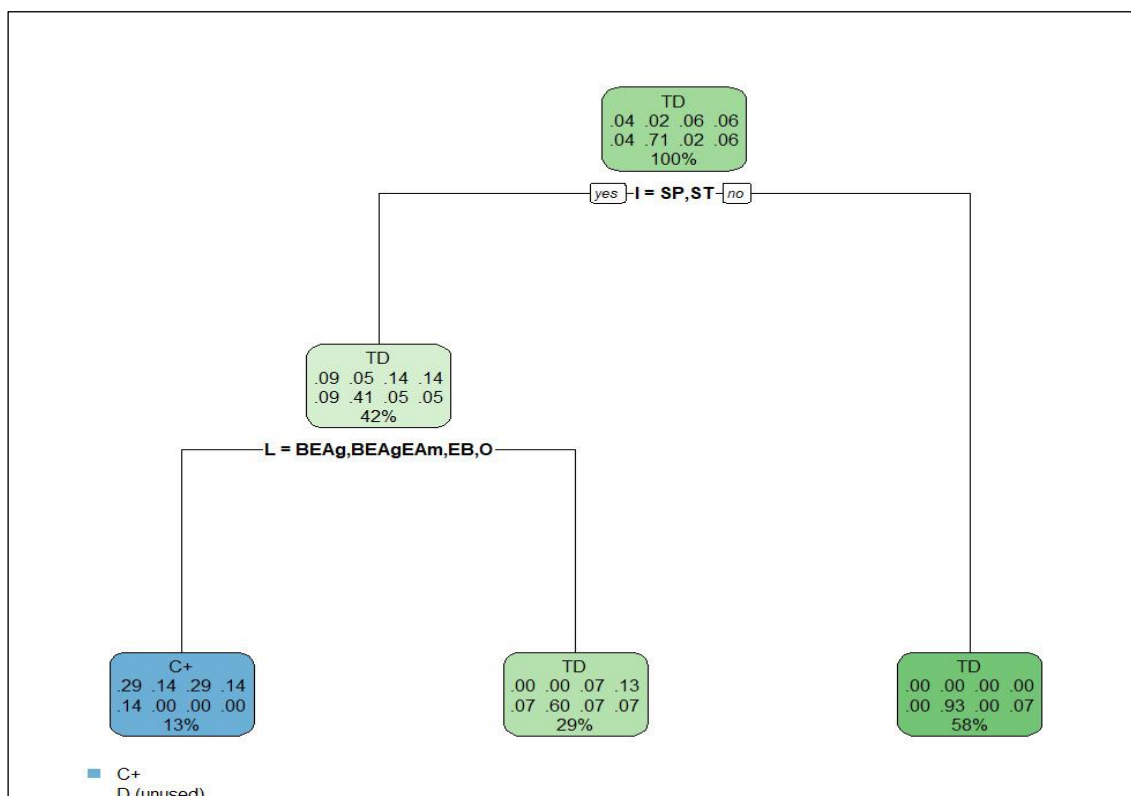
In which: TD (issuance of infraction notice: 3-10); C+ (issuance of infraction notice: 51-100); I (do you have your own website with environmental software?), SP (yes, the environmental licensing process is online in parts), ST (yes, the environmental licensing process is online in its entirety), N (no); L (which professionals compose the work team?), B (BIOLOGIST), BEAg (biologist and agronomist), BEAgEAM (biologist and environmental engineer), EB (blank), O (OTHER).

Figure 2. Factors which influence the number of infraction notices issued by the municipalities of Rio Grande do Sul in the year of 2019.

Figura 2. Fatores que influenciam no número de emissão de autos de infração pelos municípios do Rio Grande do Sul, no ano de 2019.

In this case, the samples for the response variable related to municipal environmental inspection were classified into 8 classes depending on the number of infraction notices issued, namely: Two (D), 3-10 (TD), 11-20 (OV), 21-30 (VT), 31-40 (TQ), 41-50 (QC), More than 50 (C+), Not answered and Don't know (N). The proportions within the classification tree text boxes correspond to classes in alphabetical order (C+, D, N, OV, QC, TD, TQ, VT). Thus, 4% of the samples issued more than 50 infraction notices, 2% only two, 6% did not answer or were unable to answer, 6% issued 11 to 20 (OV), 4% from 41 to 50, 71% of 3 to 10, 2% from 31 to 40, and 6% issued 21 to 30 (VT) infraction notices in the year 2019.

The variable that best explains the behavior of issuing infraction notices in 2019 was "has its own website with environmental software". There is a relationship considering that the website itself allows greater access to information, and also a person's anonymity when making environmental complaints, so these complaints generally generate environmental infraction notices. For the answer which does not have a website, 93% of the samples presented the number of infraction notices issued in the class from 3 to 10. When the answer was yes for the licensing process to be in parts (SP) or totally (ST) online, the largest proportion (41%) is also in the 3 to 10 class.

A second variable (Which professionals compose your work team and their respective training) was also efficient in separating the rest of the samples. This variable has 10 possible answers, namely: Biologist (a) (B); Biologist and Agricultural Engineer (BEAg); Biologist, Agronomist and Environmental Engineer (BEAgEAm); Blank (EB); Agronomist Engineer (Eag); Agronomist and Environmental Engineer (EAgEAm); Environmental Engineer (a) (EAm); Forest Engineer (a) (EF); Other (a) (O); Technician (a) Agricultural (TA). When the answer was B, Eag, EAgEAm, EAm, EF or TA there were no samples for classes with two or more than one hundred infraction notices issued, 7% of the samples did not answer or did not know, 13% issued from 11 to 20, 7% from 41 to 50, 60% from 3 to 10, 7% from 31 to 40, and 7% from 21 to 30 infraction notices in the year 2019.

The second group is classified by the work team component variable that explains the issuance of infraction notices in the ranges between 3-10 and 51-100. These results are indicative of the relationships between

the explanatory variables and the response variable; however, as there were few samples collected in the interviews, this affects the result of the presented classification tree.O segundo grupo é classificado pela variável dos componentes da equipe de trabalho que explica a emissão de auto de infração nas faixas entre (3-10 e 51-100. Esses resultados são indicativos das relações, entre a variáveis explicativas e a variável reposta, entretanto, como foram poucas amostras coletadas nas entrevistas isso afeta o resultado da árvore de classificação apresentado.

DISCUSSION

The type of employment of civil servants stands out regarding the factors that affected the issuance of licenses in 2019. In the case of permanent employees hired through a public tender, Gross (2006) states that when a public administrator follows the principle of impersonality, allowing the entry of any trained professional to the function, it also guarantees work continuity, regardless of the end of municipal, state, or federal management (i.e. government change), as the civil servants will remain.

It was also observed that the explanatory variable that most demonstrates results in the group of variables for the issuance of infraction notices (environmental inspection) are the work team components, which explains the issuance of infraction notices in the ranges between 3-10 and 51-100. A work team composed of several professionals enables a more accurate analysis in both the environmental inspection and environmental licensing areas; therefore, this relationship between the composition of the professional staff in the middle departments of the municipalities is interconnected with the issuance of the infraction notices. Even though licensing and inspection are two different events interconnected by law procedures, they are centered on the importance of human resources, effective civil servants and the work team being composed of several professionals in the environmental area.

In analyzing the data, it is possible to verify the demand of several municipalities for specific professionals for the licensing and inspection of some more complex undertakings. The technical team involved in environmental licensing is one of the main components for effective execution of environmental processes; however, a lack of human resources was mentioned in a study by Abreu (2017) as one of the main obstacles to the proper functioning of municipal secretariats. The issuance of infraction notices for environmental inspection also has a strong relationship with the department structure, especially with the fact that it has its own website with environmental software, which was demonstrated by the classification tree technique.

The role of the multidisciplinary team is to provide technical support for licensing and inspection, considering that there are several projects in many areas covered by *CONSEMA* resolutions, which the municipality is legally entitled to license and supervise.

In this context, the premises of Law no. 140/2011 stand out, which states in its fifth article that the federative entity may delegate execution of administrative actions assigned to it by the said law, provided that the recipient of the delegation has a qualified environmental body (BRASIL, 2011). Thus, the Rio Grande do Sul State Secretariat for the Environment issued two resolutions to clarify the concept of a qualified environmental agency: CONSEMA no.288/2014 and CONSEMA no.372/2018. Both inform about the technical staff that the municipality must have employed or in a consortium, composed by professionals who are qualified in physical and biotic environments, and in a number compatible with the demands for licensing and environmental inspection of municipal competence.

Thus, one of the problems of environmental management is its multidisciplinary composition that requires the involvement of different areas. In addition, it is faced with a deficient structure of a qualified and competent staff to carry out its licensing and inspection activities, since there is no specific legal parameter that determines the number of qualified professionals to coherently delimit the structuring of a capable environmental body with an adequate and multidisciplinary professional staff.

Therefore, the role of decentralizing environmental management to the municipalities will only become effective when there is a legal provision to form a minimum work team, because without basic human resources and structure, it is not possible to provide the desired environmental protection. In this context, it is highlighted that the main obstacles to decentralization are the lack of human resources, the training of the technical staff, physical infrastructure, and it was additionally observed that most municipalities in Rio Grande do Sul had from one to five public servants responsible for all stages of licensing enterprises (ABREU, 2017).

It should be noted that, although small, the sample obtained by this study enables inferring some important indications pointed out by the interviewees, revealing the demand for further studies on the subject. Within the sampling carried out by this study, some blocking factors were identified and the functionality of the environment departments was evaluated, with some significant points and indications of the need for future research on the specific parts of the environmental legislation which cause more obstacles in the activities of licensing and environmental inspection. Research is also needed on the ideal size of the work team in a municipal environment department.

CONCLUSION

The results of this study allow us to conclude that:

- The operating dynamics on inspection and licensing demonstrates the importance of human resources for the functioning of the municipal environmental agency.
- The indicative self-assessment carried out by the interviewees shows that the number of employees is compatible with the work demands, constituting a factor which favors good functionality of the environmental agency.
- Environmental legislation was pointed out as an obstacle regarding the functionality of the municipal environmental departments of the State of Rio Grande do Sul due to its vast legal framework, since the legislation has conceptual flaws and does not delimit situations which occur in licensing and environmental inspection.
- The department structure is an important factor for the issuance of infraction notices, centered on the importance of human resources and effective civil servants composed of a multidisciplinary work team.
- The variable in the classification tree analysis which best explains the behavior of issuing infraction notices was having its own website with environmental software; the hypothesis raised was that its own website allows greater access to information and guarantee of anonymity to make environmental complaints.

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