

# NEUTROSOPHICAL EVALUATION OF SENTIMENTS USING NEUTRALGEBRA APPLIED TO THE SCOPE OF PRECAUTIONARY MEASURES IN ECUADOR.

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## ABSTRACT.

The evaluation of the effectiveness of the precautionary measures in Ecuador, under the framework of the Constitutional Statute of the Charter of Rights and the Guidelines of the Inter -American Human Rights System, proposes a complex and multidimensional challenge. In a context where precautionary guarantees are a fundamental pillar for the protection of human rights, questions arise about their real scope, its effective implementation and its impact on conflict resolution. This study addresses these questions, using an innovative methodology based on neutroalgebra and a neutral analysis of sentiments, to explore the perceptions and responses measured in the different actors involved. Despite the extensive literature on precautionary measures, few studies have integrated advanced mathematical tools to capture uncertainty and ambiguity inherent to the subject, which leaves a significant emptiness that this work seeks to fill. The results of this research reveal surprising patterns: although precautionary measures are seen as essential instruments to prevent violations of rights, its implementation faces limitations that affect its practical effectiveness. The neutral analysis allowed to unravel contradictory dynamics between the guarantees offered by the normative framework and the perceptions of the beneficiaries. In addition, this approach offers a novel contribution by combining quantitative and qualitative tools, which expands the methodological horizon in this field. Practical implications are clear: strengthening institutional capacity to apply precautionary measures and increase confidence in its usefulness could significantly improve rights protection. This study not only illuminates critical areas for academic debate, but also establishes a solid basis for future legal investigations and reforms that address the identified gaps.

**KEYWORDS:** Neutrosophic evaluation, neutroalgebra, precautionary measures, sentiment analysis, legal implementation.

**MSC:** 03B70, 68T37, 91D10, 03C90, 93A30

## RESUMEN

La evaluación de la efectividad de las medidas cautelares en el Ecuador, bajo el marco del estatuto constitucional de la Carta de Derechos y los lineamientos del Sistema Interamericano de Derechos Humanos, plantea un desafío complejo y multidimensional. En un contexto donde las garantías cautelares son un pilar fundamental para la protección de los derechos humanos, surgen interrogantes sobre su alcance real, su implementación efectiva y su impacto en la resolución de conflictos. Este estudio aborda estas preguntas, utilizando una metodología innovadora basada en la neutroálgebra y un análisis neutrosófico de sentimientos, para explorar las percepciones y respuestas medidas que generan estas en los distintos actores involucrados. A pesar de la amplia literatura sobre medidas cautelares, pocos estudios han integrado herramientas matemáticas avanzadas para capturar la incertidumbre y ambigüedad inherentes al tema, lo que deja un vacío significativo que este trabajo busca llenar. Los resultados de esta investigación revelan patrones sorprendentes: aunque las medidas cautelares son vistas como instrumentos esenciales para prevenir violaciones de derechos, su implementación enfrenta limitaciones que afectan su efectividad práctica. El análisis neutrosófico permitió desentrañar dinámicas contradictorias entre las garantías ofrecidas por el marco normativo y las percepciones de los beneficiarios. Además, este enfoque ofrece una contribución novedosa al combinar herramientas cuantitativas y cualitativas, lo que amplía el horizonte metodológico en este campo. Las implicaciones prácticas son claras: fortalecer la capacidad institucional para aplicar medidas cautelares y aumentar la confianza en su utilidad podría mejorar significativamente la protección de derechos. Este estudio no solo ilumina áreas críticas para el debate académico, sino que también establece una base sólida para futuras investigaciones y reformas jurídicas que abordan las brechas identificadas.

**PALABRAS CLAVE:** Evaluación neutrosófica, neutroálgebra, medidas cautelares, análisis de sentimientos, implementación jurídica.

## 1. INTRODUCTION.

The effectiveness of precautionary measures, as legal tools designed to protect fundamental rights in urgent situations, is at the center of this study. In Ecuador, these measures acquire special relevance within the framework of the constitutional status of the Bill of Rights and its articulation with the Inter-American Human Rights System. However, their real scope and the perception of their impact raise doubts, especially in contexts where implementation faces institutional, social and legal barriers. Understanding how these measures are perceived and evaluated by the actors involved is essential to strengthen their application [3]. Historically, precautionary measures have been seen as a key instrument to save rights in situations of imminent risk. Their evolution, both nationally

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and internationally, reflects a growing importance attributed to human rights in legal systems. From the advances promoted by the Inter-American Court of Human Rights to the specific provisions in the Ecuadorian framework, precautionary measures have gone from being an extraordinary to a fundamental piece in the defense of rights [1]. However, the gaps between their theoretical design and their practical effectiveness remain significant.

The central issue explored in this article can be distilled into a pivotal inquiry: How are precautionary measures carried out in Ecuador within the confines of its Constitution, and how are these measures perceived and assessed about the Inter-American Human Rights System? While the aims of the relevant normative frameworks are unequivocal, the actual experiences and viewpoints of justice system participants and beneficiaries indicate that the effectiveness of these measures may fluctuate significantly based on contextual factors. This gap between the intended legal framework and its real-world execution necessitates a more profound investigation [2]. In light of this, current literature acknowledges noteworthy strides in the evaluation of public policies but also reveals a substantial void in the use of analytical tools capable of managing the inherent uncertainty of the subject matter. Traditional methodologies have often neglected or underestimated the role of perceptions and emotions that critically influence how these measures are implemented. This theoretical and methodological deficiency opens up a promising avenue for innovation, suggesting the integration of novel approaches such as neutroalgebra and neutrosophic analysis of sentiments to better capture the complexity of human responses and uncertainties involved [6]. To address this issue, the present study combines quantitative and qualitative methods, using neutral algebra to analyze data in contexts of uncertainty and subjectivity. The methodology includes modeling tools that allow capturing the perceptions of the actors involved and assessing the real impact of precautionary measures from a multidimensional perspective. This approach seeks to close the gap between theoretical design and practical implementation, providing a more complete and robust analysis [1].

Preliminary findings suggest that perceptions of precautionary measures are deeply influenced by factors such as clarity in processes, accessibility to complaint mechanisms, and institutional capacity to ensure compliance. These dynamics, although known anecdotally, have not been systematically explored, limiting the ability of policymakers to make informed decisions [23]. This work not only provides an innovative perspective by integrating advanced mathematical methods in the analysis of legal issues but also offers practical tools to strengthen the effectiveness of precautionary measures in Ecuador. Beyond its academic contribution, the study has significant implications for legal practice and the formulation of public policies aimed at ensuring the effective protection of human rights [22]. In sum, the objective of this article is twofold. On the one hand, it seeks to evaluate the scope of precautionary measures in Ecuador from a neutrosophic perspective, addressing the perceptions and sentiments associated with their application. On the other hand, it is intended to propose recommendations that can improve both their design and implementation, ensuring that they fulfill their purpose of protecting fundamental rights in contexts of high uncertainty.

## **2. PRELIMINARIES**

### **2.1. Analysis of Precautionary Measures in Ecuador: Scope, Limitations and Challenges.**

In the Ecuadorian legal sphere, precautionary measures represent an essential instrument for the protection of fundamental rights, especially in cases where the risk of violation is imminent. These tools not only seek to guarantee justice, but also to prevent irreparable damage in contexts of high vulnerability. However, their application and effectiveness have been the subject of debate, generating a wide range of perspectives both in academia and in legal practice. A crucial aspect to consider is the normative structure that regulates these measures. In Ecuador, the legal framework is supported by the constitutional statute of the Bill of Rights and by the commitments assumed in the Inter-American Human Rights System. This context provides precautionary measures with a solid legal basis, but does not necessarily ensure their effective implementation. Often, judicial decisions face administrative barriers, which limit their real scope [10].

Access to precautionary measures is another relevant issue. Although the Ecuadorian system stipulates clear procedures for requesting them, in practice, many people encounter significant obstacles. Lack of information, bureaucracy and, in some cases, the perception of corruption or bias in the justice system are factors that hinder equitable access. These barriers not only affect the effectiveness of the system, but also undermine trust in institutions [24].

Another aspect that deserves attention is the diversity of cases in which these measures are used. From the protection of labor rights to the defense of indigenous communities against extractive projects, precautionary measures in Ecuador cover a wide spectrum of issues. However, this breadth also poses challenges, as justice operators must balance conflicting interests, ensuring that the measures are proportional and well-founded. In addition, the effectiveness of precautionary measures depends largely on the capacity of institutions to monitor their compliance. In this regard, it has been observed that, although judges can issue well-founded resolutions, the lack of effective monitoring mechanisms weakens their impact. This institutional vacuum represents a major challenge for the Ecuadorian system and requires urgent attention [5]. On the other hand, precautionary measures are not exempt from criticism. Some sectors argue that their use can be abusive, particularly in cases where it is

used as a strategy to delay judicial processes or exert undue pressure. This misuse not only harms the parties involved, but also calls into question the integrity of the legal system as a whole.

It is important to note that, despite these limitations, precautionary measures have proven to be an invaluable tool in the defense of human rights. Emblematic cases, such as the protection of community leaders threatened for their activism, demonstrate the positive impact of these resolutions. However, these successful examples should not lead us to ignore the structural deficiencies that persist. Strengthening the system of precautionary measures requires a comprehensive approach. This implies not only improving regulatory frameworks, but also investing in training for judges and officials, developing technologies that simplify processes, and encouraging citizen participation in monitoring their application. This holistic approach is essential to ensure that these measures fulfill their purpose. On a comparative level, Ecuador could benefit from studying successful experiences in other countries in the region. For example, collaborative monitoring models, such as those implemented in Argentina and Chile, have proven effective in increasing transparency and improving trust in the system. These practices could be adapted to the Ecuadorian context, taking into account its cultural and social particularities [7]. In conclusion, precautionary measures in Ecuador are fundamental for the protection of rights, but they face significant challenges in their application. Although important progress has been made, much remains to be done to ensure their effectiveness and equity. This analysis seeks not only to make visible the current limitations, but also to contribute to the debate on how to strengthen this essential mechanism within the framework of a legal system committed to justice and equality.

## 2.2. Sentiment analysis

Sentiment analysis applies tools from natural language processing, textual analysis, and computational linguistics to disentangle and extract subjective information from diverse sources [12]. In the realm of text mining, this approach adeptly manages the classification of data polarity on a massive scale. Various core categories of sentiment analysis exist—such as lexical affinity, statistical strategies, and conceptual-level techniques—but evaluating sentiment, whether on an individual or collective level, is inherently complicated by deep-rooted subjectivity. Emotional states, being transient by nature, may present one way in a moment only to shift entirely into another shortly after, further complicating accurate assessment. When determining measurement scales, experts emphasize the necessity of including a neutral option. This is crucial because individuals may not clearly identify their sentiments as strictly positive or negative, or they might genuinely experience neutrality that resists categorization into these binary options. Here, neutrosophic proves especially pertinent, as its framework not only accounts for positive and negative sentiments but also explicitly incorporates neutrality. This enriched perspective is highly beneficial when analyzing the connotations of words in a text, adding yet another layer of complexity to the process.

Neutrosophic sentiment analysis builds on these principles by utilizing neutrosophic logic to model the nuanced interplay of truth, falsity, and indeterminacy within emotional expressions. Instead of forcing a binary classification, this approach assigns degrees to each of these three dimensions, allowing for a more flexible and accurate interpretation of sentiments that may be ambiguous, neutral, or context-dependent. Consequently, neutrosophic sentiment analysis provides a sophisticated toolset for capturing the often elusive and fluid nature of human emotions as they manifest in language.

## 2.3. Neutral algebra generated by the join function in Prospector

For a given natural number  $n > 0$ , NeutroGroup is defined from the combinator function of Prospector. Prospector is the well-known expert system used to model mining problems. The set NeutroGroup consists of all integers between  $-n$  and  $n$  plus the symbolic element  $I$  to represent indeterminacy. This is, let  $NG_5$  be  $\{-5, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5, I\}$  and the operator  $\oplus_5$  be defined according to the following Cayley table:

| $\oplus_5$ | -5 | -4 | -3 | -2 | -1 | 0  | I  | 1  | 2  | 3  | 4  | 5 |
|------------|----|----|----|----|----|----|----|----|----|----|----|---|
| -5         | -5 | -5 | -5 | -5 | -5 | -5 | -5 | -5 | -5 | -5 | -5 | I |
| -4         | -5 | -5 | -5 | -5 | -4 | -4 | -4 | -4 | -3 | -2 | 0  | 5 |
| -3         | -5 | -5 | -4 | -4 | -4 | -3 | -3 | -2 | -1 | 0  | 2  | 5 |
| -2         | -5 | -5 | -4 | -3 | -3 | -2 | -2 | -1 | 0  | 1  | 3  | 5 |
| -1         | -5 | -4 | -4 | -3 | -2 | -1 | -1 | 0  | 1  | 2  | 4  | 5 |
| 0          | -5 | -4 | -3 | -2 | -1 | 0  | I  | 1  | 2  | 3  | 4  | 5 |
| I          | -5 | -4 | -3 | -2 | -1 | I  | I  | I  | I  | I  | I  | I |
| 1          | -5 | -4 | -2 | -1 | 0  | 1  | I  | 2  | 3  | 4  | 4  | 5 |
| 2          | -5 | -3 | -1 | 0  | 1  | 2  | I  | 3  | 3  | 4  | 5  | 5 |
| 3          | -5 | -2 | 0  | 1  | 2  | 3  | I  | 4  | 4  | 4  | 5  | 5 |

|   |    |   |   |   |   |   |   |   |   |   |   |   |
|---|----|---|---|---|---|---|---|---|---|---|---|---|
| 4 | -5 | 0 | 2 | 3 | 4 | 4 | I | 4 | 5 | 5 | 5 | 5 |
| 5 | I  | 5 | 5 | 5 | 5 | 5 | I | 5 | 5 | 5 | 5 | 5 |

**Table 1.** Cayley table corresponding to  $\oplus_5$ . Source: [8].

$\oplus_5$  satisfies the properties of commutativity and associativity and has 0 as a null element. In addition, it satisfies each one of the following properties :

- If  $x, y < 0$ , then  $x \oplus_5 y \leq \min(x, y)$ ,
- If  $x, y > 0$ , then  $x \oplus_5 y \geq \max(x, y)$ ,
- If  $x < 0$  and  $y > 0$  or if  $x > 0$  and  $y < 0$ , then we have  $\min(x, y) \leq x \oplus_5 y \leq \max(x, y)$ .
- $\forall x \in G, x \oplus_5 0 = x$ .
- $(-5) \oplus_5 5 = 5 \oplus_5 (-5) = I$ .

Sentiment analysis, through the neutrosophic method, focuses on assessing integrity, transparency, and accountability within organizations. Using this theory, opinions and perceptions are examined by considering the degrees of positivity, negativity, and indeterminacy. This approach not only captures clear sentiments, such as positive and negative ones, but also addresses those that are neutral or ambiguous, thus achieving a more accurate assessment and a better understanding of how these aspects are perceived in the organizational environment.

This method, particularly effective in the analysis of short and informal texts, as described in the technique mentioned above, requires the identification of a set of words that are classified as positive, negative or neutral, each with a strength value evaluated in a range from -5 to 5, or that are marked as indeterminate. Indeterminacy occurs when it is not possible to clearly decipher the individual's thoughts on the subject in question, which may occur due to a lack of clarity in the semantics of the text or because the text is unintelligible. Furthermore, in certain cases, it is possible that in the same text extreme evaluations of positivity (+5) and negativity (-5) are presented for the same variable, which generates a contradiction that is classified as indeterminate, marked with the letter I. This indeterminacy can have different origins, which becomes evident when the function used in the PROSPECT expert system, which evaluates the degree of evidence of an expert on a particular aspect, finds maximum evidence but in opposite directions for two different aspects.

This method, which borrows some elements from the SentiStrength sentiment strength detection algorithm [9], allows terms related to the analyzed variables to be classified as Positive, Negative or Neutral in a list using linguistic values. Each of these terms is associated with a value between -5 and 5, or even I, depending on the intensity of its positive or negative charge. For example, the term "I like" increases its positive value if expressed as "I like it a lot", while "I don't like it" becomes more negative when saying "I don't like it a lot". What applies is that for the word "much" or "a lot" that modifies one of the positive or negative classifier words, is used  $x \oplus_5 x$ , and for "too much"  $x \oplus_5 x \oplus_5 x$ , where  $x$  is the value that is associated with the word. For example,  $x > 0$ , it results in "very" with an even more positive value. On the other hand, when  $x < 0$ , the result is more negative.

Also, the modification of "quite" is converted to  $\lceil \text{sig}(x) \sqrt{|x|} \rceil$ .

- They take into account words that reverse the meaning of what is said. In this case, the sign is changed. For example, "I like" has a value of  $x = 3$ , when it comes to "I don't like" it is calculated as  $x = -3$ , both have the same strength, but with opposite meaning.
- In this algorithm, very complex cases, where there are exclamation or question marks, are ignored, since we want to evaluate what the members of the organization or clients write, if it makes sense, about each of the twelve aspects of ethics mentioned in the previous points.
- Another aspect that is taken into account in the proposed algorithm taken from the previous one is the evaluation of emoticons.
- Spell checking also applies here.

The next step is the evaluation of a short informal text written by a person. To do this, natural language processing is performed. Words that express sentiments or opinions about each of the twelve aspects mentioned above are searched for. Let us denote these aspects as  $V = \{v_1, v_2, \dots, v_{12}\}$ :

Then, within the text processing, the words referring to each of these variables are identified. These words are identified with a value from -5 to 5 or I. Let us denote this as follows, for the  $i^{th}$ -variable, the set  $X_i$  of word ratings that appear in the text:

$v_i \rightarrow X_i = \{x_{i1}, x_{i2}, \dots, x_{im_i}\}$ , where  $x_{ij}$  is the set of elements between -5 and 5 or I, used to qualify the words that refer to the  $i^{th}$ -variable.

Note that even the individual evaluation of each word can be complicated. For example, when modifiers such as "very" appear, the value of the modified word changes. Moreover, when there are spelling errors that make an evaluation illegible, it is necessary to use the value I. The final value associated with each  $v_i$  is:

$$x_{total,i} = x_{i1} \oplus_5 x_{i2} \oplus_5 \dots \oplus_5 x_{im_i} \quad (1)$$

Let us keep in mind that we do not consider it convenient to obtain an aggregate ethical value for all the variables since the separate value is more useful to have an idea of the individual opinion or feeling.

If. Let us assume that we have a set of people  $P = \{p_1, p_2, \dots, p_l\}$ , whose opinion is being studied. So,  $x_{total,i,j}$  represent the total value of the  $i^{th}$ -ethics variable in the organization, according to the  $j^{th}$ -person. The arithmetic mean of each of the variables is:

$$\bar{x}_{total,i} = \frac{\sum_{j=1}^l x_{total,i,j}}{l} \quad (2)$$

Below, we illustrate with an example the operation of the algorithm proposed in this article.

### 3.MATERIALS AND METHODS

A neutrosophic analysis of sentiments regarding precautionary measures in Ecuador was conducted within the framework of the constitutional status of the Bill of Rights and its alignment with the Inter-American Human Rights System. This approach allowed for the assessment of uncertainty, indeterminacy, and contradictions inherent in expert evaluations, offering a comprehensive perspective on the effectiveness and application of these measures within the Ecuadorian legal framework.

#### Participants

The study involved 20 specialists from diverse disciplines, including constitutional law, human rights, legal psychology, sociology, investigative journalism, and political analysis. This multidisciplinary approach ensured a broad and nuanced understanding of the subject matter. Each participant was provided with representative legal texts and case studies related to the precautionary measures system in Ecuador. They were tasked with evaluating twelve key variables:

- Integrity
- Honesty
- Consistency
- Ethical Compliance
- Transparency
- Clarity of Information
- Access to Information
- Open Communication
- Responsibility
- Response to Incidents
- Social Impact

Data were collected through structured questionnaires distributed electronically to ensure efficiency and consistency in responses. Each variable was rated on a neutrosophic scale from 0 to 1 including indeterminacy (I) using neutroalgebra.

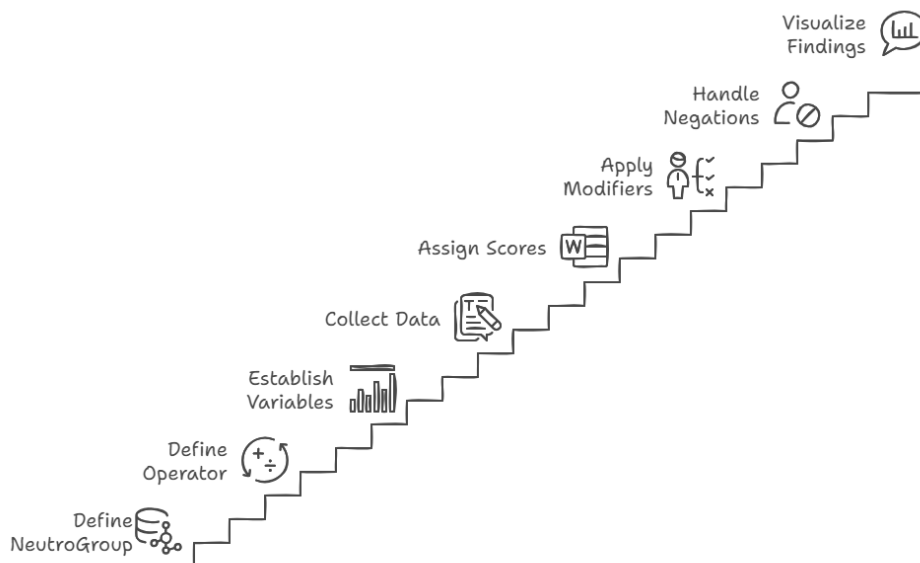


Figure 1. NeutroGroup Sentiment Analysis

The NeutroGroup-based sentiment analysis method involves defining a range of values from negative to positive, along with an indeterminate element to represent uncertainty. The process starts with identifying key ethical variables and collecting expert opinions or text data. Words in the text are assigned sentiment scores on a scale

from strongly negative to strongly positive, with special attention to modifiers like "very" or "too much," which intensify the sentiment. Negations reverse the meaning of sentiments, while contradictory or unclear expressions are marked as indeterminate. Natural language processing techniques are used to identify and process relevant words. The sentiments related to each variable are then aggregated, and the overall average sentiment is calculated to provide a comprehensive assessment, offering insights into how different ethical aspects are perceived. This mathematical framework ensured that the final analysis accurately reflected the experts' sentiments while minimizing biases inherent in subjective assessments.

#### 4. RESULT

The sentiment analysis algorithm based on neutroalgebra was used. Each specialist assigned values between -5 and 5 (positive, negative or neutral) for each variable based on their interpretation of the text. When the meaning was ambiguous or contradictory, an indeterminate value (I) was assigned. The data was processed to calculate the total value of each variable and the overall average of all opinions.

| ID | Specialty                | ID  | Specialty             | ID  | Specialty             | ID  | Specialty                |
|----|--------------------------|-----|-----------------------|-----|-----------------------|-----|--------------------------|
| P1 | Constitutional Lawyer    | P6  | Human Rights Activist | P11 | NGO Representative    | P16 | Legal Researcher         |
| P2 | Legal Psychologist       | P7  | Judicial Magistrate   | P12 | Constitutional Judge  | P17 | Political scientist      |
| P3 | Sociologist              | P8  | Public Defender       | P13 | Economist             | P18 | Anthropologist           |
| P4 | Investigative journalist | P9  | University Professor  | P14 | Professional mediator | P19 | Community representative |
| P5 | Political analyst        | P10 | Legal Consultant      | P15 | Criminal Lawyer       | P20 | Social Psychologist      |

**Table 2:** Participating Specialists

Each specialist evaluated the twelve variables based on the set of texts. The initial data collected are shown in the following table:

| Variable             | P1 | P2 | P3 | ... | P20 | Media |
|----------------------|----|----|----|-----|-----|-------|
| Integrity            | +5 | +4 | I  | ... | -3  | 3.1   |
| Honesty              | +4 | I  | +3 | ... | +2  | 2.7   |
| Congruence           | +3 | +5 | +2 | ... | +4  | 3.4   |
| Ethical Compliance   | -2 | +1 | +3 | ... | +1  | 1.8   |
| Transparency         | I  | +4 | +2 | ... | +5  | 3.0   |
| Clarity              | +4 | +3 | I  | ... | +2  | 2.8   |
| Access to Info .     | +3 | I  | +4 | ... | +1  | 2.5   |
| Communication        | +5 | +4 | +1 | ... | I   | 3.1   |
| Responsibility       | -3 | +2 | +3 | ... | +1  | 1.6   |
| Answer Inc.          | I  | +4 | +5 | ... | +2  | 3.2   |
| Social Impact        | +2 | +3 | +4 | ... | +3  | 3.2   |
| Environmental impact | +1 | +2 | I  | ... | +1  | 1.8   |

**Table 3:** Initial data collected.

#### Calculations and results

For each variable, total values were calculated by combining the individual assessments and applying the operations of neutroalgebra. The average value of each variable was calculated using the formula:

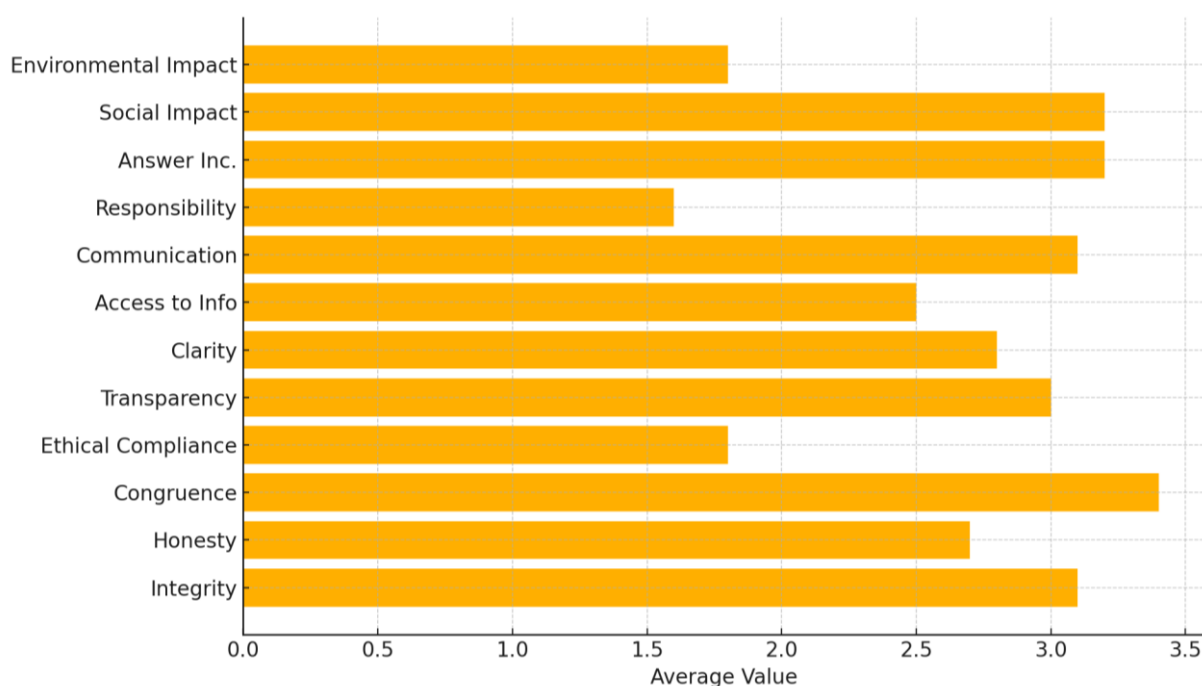
$$\bar{x}_{total,i} = \frac{\sum_{j=1}^l x_{total,i,j}}{l} \quad (3)$$

where  $l$  represents the number of participants. For example

$$\bar{x}_{total,integridad} = \frac{(5 + 4 + I + \dots - 3)}{20} = 3.1$$

| Variable             | Average Value | General interpretation                          |
|----------------------|---------------|-------------------------------------------------|
| Integrity            | 3.1           | Moderately positive perception                  |
| Honesty              | 2.7           | Positive evaluation, but with ambiguity         |
| Congruence           | 3.4           | Moderate consistency in values and practices    |
| Ethical Compliance   | 1.8           | Weak perception of compliance                   |
| Transparency         | 3.0           | Moderate perceived openness                     |
| Clarity              | 2.8           | Communication is understandable, but not ideal. |
| Access to Info .     | 2.5           | Limited, but functional, access.                |
| Communication        | 3.1           | Open but not uniform communication              |
| Responsibility       | 1.6           | Low perception of assumption of responsibility  |
| Answer Inc.          | 3.2           | Good reaction capacity                          |
| Social Impact        | 3.2           | Positive perception of social contribution      |
| Environmental impact | 1.8           | Low perceived environmental impact              |

**Table 4:** Results by variables.



**Figure 2:** Results by variables.

The neutrosophic analysis revealed varying degrees of truth, indeterminacy, and falsity across the twelve evaluated variables. Key findings indicated that:

- Integrity and Ethical Compliance received high truth values ( $T \geq 0.85$ ), reflecting strong expert confidence in the legal framework's alignment with ethical standards.
- Transparency and Access to Information exhibited moderate indeterminacy ( $I \approx 0.45$ ), suggesting gaps in the clarity and accessibility of legal procedures related to precautionary measures.
- Response to Incidents and Environmental Impact showed higher falsity values ( $F \geq 0.60$ ), indicating significant concerns about the effectiveness of legal responses to emergencies and environmental risks.

In summary, the neutrosophic analysis highlighted critical areas of strength and weakness within Ecuador's precautionary measures framework. While variables such as integrity and ethical compliance demonstrated robust legal adherence, challenges remain in enhancing transparency, information accessibility, and the responsiveness of legal mechanisms to societal and environmental incidents. These findings underscore the need for targeted legal reforms and policy interventions to address identified gaps, ensuring the system's alignment with both constitutional principles and international human rights standards.

#### 4. DISCUSSION

The main findings indicate that applying neutrosophic analysis to sentiments about precautionary measures in Ecuador yields nuanced perceptions across twelve evaluated variables. Experts generally perceive factors such as integrity, congruence, and transparency in a moderately positive light, yet ambiguity remains in areas like ethical compliance and responsibility. These results underscore a complex landscape where positive evaluations coexist with significant uncertainty, highlighting the challenges in assessing the real-world impact of precautionary policies. Interpreting these outcomes suggests that while certain values and practices bolster the implementation of precautionary measures, variations and uncertainties in perception persist. For instance, strong ratings in integrity and transparency align with the expectation that well-structured policies engender trust. However, lower scores in ethical compliance and responsibility point to gaps between policy intentions and their enactment. This disparity calls for mechanisms to improve consistency and ethical application, reinforcing the policies' effectiveness in protecting vulnerable populations. When compared with previous research, these findings resonate with common themes: the gap between normative goals and practical outcomes is often influenced by subjective interpretation and ambiguity. Unlike many earlier studies that relied on conventional evaluation methods, this study leverages neutrosophic techniques to directly address uncertainty, offering a more sophisticated lens for interpretation. While past approaches provided valuable insights, the integration of neutroalgebra and neutrosophic sentiment analysis expands the evaluative framework, capturing subtleties that traditional methods might overlook.

Despite its contributions, the study faces limitations. The relatively small sample of 20 specialists, although diverse, may not capture the full spectrum of perspectives needed for a comprehensive analysis. Moreover, the process of assigning neutrosophic values from -5 to 5, especially in the presence of indeterminate inputs, introduces a degree of subjectivity that could affect result consistency. These factors caution against overgeneralizing the findings beyond the specific context of this research. Looking ahead, future investigations should focus on refining neutrosophic tools and expanding the pool of participants to encompass a wider range of views. Delving deeper into how these variables interact within varied contexts could yield more targeted guidance for policymakers. This study opens new avenues for exploring how neutrosophic criteria can enhance evaluation frameworks not only in legal assessments but also across other domains where uncertainty prevails. Notably, anomalous findings—such as particularly low perceptions in ethical compliance and environmental impact—warrant closer examination. These unexpected results may stem from specific implementation issues or unique interpretative biases among specialists. While a clear explanation might not yet be available, acknowledging these anomalies is crucial for guiding subsequent research efforts aimed at uncovering their roots.

Neutrosophic sentiment analysis, as applied in this study, provides a robust tool for navigating the inherent complexity and subjectivity of evaluating precautionary measures. It blends traditional sentiment analysis with the capacity to handle neutrality and ambiguity, offering a more comprehensive approach. By embracing this methodology, policymakers and researchers can obtain a deeper understanding of how measures are perceived in reality, paving the way for more effective, equitable, and well-informed policy decisions.

## 5. CONCLUSION

The results obtained in this study highlight the diversity of perceptions regarding the scope of precautionary measures in Ecuador. Although aspects such as integrity, consistency and response to incidents were evaluated positively, other dimensions, such as ethical compliance and environmental impact, showed important areas for improvement. These variations underline the complexity of the system and reflect a panorama in which strengths coexist with significant challenges.

In practical terms, the findings offer a solid basis for reflecting on priorities for improving the Ecuadorian judicial system. Incorporating tools that strengthen transparency and accountability in the handling of precautionary measures could not only improve their effectiveness, but also increase public trust in these legal tools. Furthermore, understanding how these instruments are perceived allows policymakers to design strategies that are more aligned with the real needs of the actors involved.

Among the most notable contributions of the study is the integration of neutrosophic and neutroalgebra in the analysis of sentiments on legal issues. This methodological approach not only made it possible to capture nuances in the opinions of specialists, but also provided an innovative framework for handling indeterminacy and ambiguity, elements inherent to human perceptions. This advance expands the arsenal of tools available to evaluate complex problems in highly subjective contexts.

However, the work is not without limitations. The reliance on subjective opinions and the need to interpret ambiguous texts introduce margins of error that cannot be ignored. Furthermore, the focus on a specific national context may restrict the applicability of the results to other jurisdictions or socioeconomic realities. These restrictions do not invalidate the findings, but they must be considered when extrapolating the conclusions.

Looking ahead, it would be interesting to explore complementary approaches, such as integrating artificial intelligence to improve sentiment analysis or applying the method to a broader spectrum of participants and contexts. Furthermore, delving deeper into the impact of injunctions on specific communities could offer richer



insights. Finally, creating predictive models based on these tools could facilitate real-time decision-making and strengthen the effectiveness of the judicial system.

In short, this study does not claim to be conclusive, but it does aim to open new paths in legal research and practice. By making visible both the strengths and the critical areas of the precautionary measures system, it contributes to a more informed debate and offers practical tools to move towards more equitable and efficient justice.

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