Neutrosophic Hypothesis to validate a modification for Article 630 of the Integral Organic Criminal Code of Ecuador

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Abstract. In Ecuador, the Conditional Suspension of Sentence is considered a special procedure, whose rules regulate legal acts within society, the investigation of certain crimes and the prosecution of those responsible and, on the other hand, allows for the avoidance of the penalties inherent in the custodial sentence. However, the indiscriminate application of this suspension generates conflict of interests since it can violate the right of the victims to compensation. Based on the foregoing, the present investigation aims to propose a modification for Article 630 of the Integral Criminal Code, which establishes that the conditional suspension of the sentence will not proceed when the crime committed involves death. To this purpose, a neutrosophic hypothesis was applied as a statistical tool to validate the criteria of legal professionals in the city of Babahoyo with regard to the justification and the proposed modification. The results obtained allowed to infer a high qualification about the relevance of the proposal.

Keywords: Conditional Suspension of Sentence, single-value neutrosophic set, neutrosophic hypothesis.

1 Introduction

The punitive and preventive exercise of the State is regulated by criminal law, while the prevailing thinking of society is manifested in the rules that make up the legal system, as a social reflection[1].

The Conditional Suspension of Sentence emerged as a legal figure in some countries, as a procedural mechanism to deal with the social problems related to prison overcrowding.

One element taken into account is the expenditure of state resources on the rehabilitation of those who have transgressed social norms. The States have found it necessary to adapt certain mechanisms so that, based on the proportionality between the crime and the sentence, the need to apply a custodial sentence is verified when in its place, the purpose of the sentence can be achieved, with social rehabilitation and reintegration without the need for imprisonment.

The National Plan for Good Living 2017-2021, called "Rights for All throughout Life," is based on the principle that every human being is a subject of rights, from the beginning of his or her life to the end". However, it is necessary to focus its application on the Ecuadorian legislation, the parameters that govern its adoption, the judicial actors involved in this procedure and the rates of application of the procedure[2, 3].

The analysis of this mechanism should first determine the body of law, mainly the Constitution of the Republic, and the Integral Criminal Code. The importance of the doctrine in criminal matters dealing with the conditional suspension of sentences, in addition to legislation from other countries that also takes into consideration the conditional suspension of sentences [4].

Article 77 of Ecuador's Carta Magna states that "after the person is found guilty, he will serve his sentence in a Social Rehabilitation Center, serving the sentence imposed by the judge or judges, but may also have alternative measures in this type of case[5].

The Conditional Suspension of the Sentence[6] is considered a special procedure, whose rules regulate the legal acts within the society and within an investigation of certain crimes, and prosecutions of those responsible for them. This suspension of sentence may be used to prevent the application of the sanctions inherent to the custodial sentence.

Several authors have defined this legal concept by referring to the history of this legal figure.

The conditional suspension of the sentence is a custodial sentence and this suspension is only given for minor crimes, that is, for less serious crimes that do not cause so much harm to the victim. Many times those who applied for this measure in the past did not enter the prison, replacing the confinement and applied this measure to ensure the rehabilitation of the defendant[7].

In this case, the aforementioned jurist clarifies that it should not be applied to all types of crimes, but only in cases in which, in its effect, the damage received by the victim does not classify the infraction as a serious one. With regard to this specification, other authors made significant contributions to his investigations. Such is the case of Sierra, who expressed "This conditional suspension of the sentence will not apply to those crimes where sexual integrity and legal assets such as life are at stake. Here, the offender or offenders are stigmatized simply because they have committed certain crimes against the legal assets of each human being, which are repugnant to society." [8]

The subjects of the crime are those persons who intervene to commit an illicit act and these will be punished with a penalty equivalent to the degree of responsibility for the act. For this reason, the concept that there are no subjects who participate in the crime to more than one actor, depending on the degree of their participation, is the reason why the proportionality of the punishment is often not taken into account with the crime, because neither participation nor the degree of responsibility is considered[9].

For this reason, when the judges impose the punishment, they must do so in the best possible way so as not to violate any of the rights of the defendants. The motivating sanction establishes the criminal sanctions in which the defendant refrains from adjusting his conduct to the act or deed committed; the causal link that exists between the norms and the criminal types in which it establishes appropriate sanctions for the defendants themselves.

At the same time, however, they must keep in mind that the punitive measure must correspond to the magnitude of the crime committed.

To this end, possible mitigating and aggravating factors must be weighed, which are derived from the circumstances of the crime, and, depending on the nature of the crime, both the existence of the act and the criminal circumstance and the complexity of the crime with which the defendant is charged must be ascertained before a criminal sanction is considered[9-11].

Mitigating circumstances are all those that a prisoner may take advantage of in the case of a less serious crime, and these may reduce the degree of guilt of the person being prosecuted, and thus lead to a reduction of the penalty.

Mitigating factors are the main arguments when applying for the conditional suspension of the sentence. Therefore, the authors propose the following:
LAW REFORMING ARTICLE 630 OF THE INTEGRAL ORGANIC PENAL CODE.
    Article 630.- Conditional suspension of the sentence. -
    5.- The conditional suspension of the sentence will not proceed in the case of culpable traffic offences resulting in death.

The objective of this work is to validate the proposal and its legal argument by applying a neutrosophic hypothesis test.

2 Materials and methods

The present investigation studied the existing problem in the city of Babahoyo, province of Los Ríos, where hundreds of legal processes have been developed in which defendants have requested the application of the Conditional Suspension of the Sentence. A significant group of specialists on the subject, with vast experience in the type of case mentioned above, was consulted in this city. The composition of the sample, as well as the weights of each type of specialist, are shown in table 1[12-14].

Specialist	Sample	Weight
Lawyers in free practice	52	0.4
Judges of the Babahoyo Criminal Unit	8	0.6

Table 1. Sample composition and weights

A survey composed of 5 statements related to the proposed modification was applied in order to record the value that each specialist assigns to the proposal. The survey used has as a source of fundamental information for statistical inference. Below, we reproduce de 5 statements included in the survey:
1. Sentenced persons have the right to benefit from the Conditional Suspension of Sentence.
2. The indiscriminate application of the Conditional Suspension of Sentences violates the right of the victims to full compensation for the harm suffered.
3. The Conditional Suspension of Sentence should only be applied to certain types of criminal offences established in the regulations.
4. Crimes involving death, regardless of their category, should be excluded from the legal benefit of Conditional Suspension of Sentence.

5.   An amendment to Article 630 of the Integral Criminal Code is required, establishing that the Conditional Suspension of Sentence shall not apply when the crime committed involves death.

The fifth affirmation will allow the direct recording of the value that the specialists assign to the proposed reform to Article 630 of the Integral Criminal Organic Code proposed in this investigation. While the first four items allow for the validation of the main elements of the legal argument underlying the proposed reform.

The possible answers were predefined by means of linguistic terms to which Single Value Neutrosophic Sets (SVNS) were assigned, in order to manage the indetermination associated with the process of statistical management of this type of information by applying the necessary elements of neutrality[15-18].

Neutrosophy is a new branch of philosophy, which studies the origin, nature and scope of neutralities, as well as their interactions with different ideational spectra. Neutrosophy have its origin on paradoxism a movement in art and science founded by Florentin Smarandache[19-21].

Smarandache introduced the degree of indeterminacy/neutrality (I) as independent component in 1995 (published in 1998) and he defined the neutrosophic set on three components: (T, I, F)= (Truth, Indeterminacy, Falsehood), where in general T, I, F are subsets of the interval [0, 1]; in particular T, I, F may be intervals, hesitant sets, or single-values[22-24].

It is truly complex to apply the operators of theoretical sets and even more so of the neutrosophic sets. That is why, single value neutrosophic sets (SVNS) were developed to facilitate their use for practical purposes[25, 26].

Below is the definition of a single-value neutrosophic set (SVNS).

Let X be a universe of discourse, a SVNS A over X has the following form[27]:

$$A = \{\langle x, t_a(x), i_a(x), f_a(x)\rangle: x \in X\}d \tag{1}$$

Where

$t_a(x): X \rightarrow [0,1], i_a(x): X \rightarrow [0,1] \ y \ f_a(x): X \rightarrow [0,1]$

with

$0 \leq t_a(x), i_a(x), f_a(x) \leq 3, \forall \ x \in X$

The intervals $t_a(x), i_a(x), f_a(x)$ denote the memberships to true, indeterminate and false from x in A, respectively [4].

To assign a crisp number as a value of a single valued neutrosophic set, a scoring function can be applied. This function will allow operations using a crisp number to contain the degrees of true, indeterminate and false in the SVNS. Although there are several scoring functions in the literature consulted, the one defined below will be used for this research.

Let A = $t_a(x), i_a(x), f_a(x)$ be a single neutrosophic number , a score function s of a single valued neutrosophic number, based on the truth-membership degree, indeterminacy-membership degree and falsehood membership degree is defined by[28]:

$$s(A) = 2 + t_a(x) - i_a(x) - f_a(x) \tag{2}$$

For this investigation will be written:

$$s(V_{ij}) = 2 + t_v(x_{ij}) - i_v(x_{ij}) - f_v(x_{ij}) \tag{3}$$

Where $s(V_{ij})$ is the score of the $SVNS_{ij}$ correspondent to the linguistic term used by the respondent j to value the judicial significance or importance of the i statement.

The linguistic terms, SVNS and the scoring used are shown on Table2.

LINGUISTIC TERM	SVN NUMBERS	SCORING
Extremely High (EH)	(1; 0; 0)	3
Very Very High (VVH)	(0.9, 0.1, 0.1)	2.7
Very High (VH)	(0,8; 0,15; 0,20)	2.45
High (H)	(0.70,0.25,0.30)	2.15
Medium High (MH)	(0,60; 0,35; 0,40)	1.85
Medium (M)	(0,50; 0,50; 0,50)	1.5
Medium Low (ML)	(0,40; 0,65; 0,60)	1.15
Low (L)	(0.30,0.75,0.70)	0.85
Very Low (VL)	(0,20; 0,85; 0,80)	0.55
Very Very Low (VVL)	(0.10,0.90,0.90)	0.3
Extremely Low (EL)	(0; 1; 1)	0

Table 2. Linguistic terms, SVNS and the scoring

Once the sample results are recorded, the weighted average score will be calculated.

Weighted Average Score:

$$was_i = \frac{1}{n}\sum_{j=1}^{n} w_j \cdot s(V_{ij}) \tag{4}$$

Where was_i is the sample's weighted average score function of the statement i, and w_j is the weight of the respondent's j category.

The was_i is only a sample measure, so it's necessary to demonstrate that the population average parameter is high enough to state that the elements of the judicial argument and the reform to Article 630 of the Integral Organic Criminal Code proposed in this research has a high or greater value for the population of the professionals of the Babahoyo city[4].

Now we must apply a Neutrosophic Hypothesis Test for the population media to estimate the acceptance of the proposal at a population level.

A Neutrosophic Hypothesis is a statement about the neutrosophic values of a single or several population characteristics[29] .

A Neutrosophic Null Hypothesis, denoted by NH_0, is the statement that is initially assumed to be true. While the Neutrosophic Alternative Hypothesis, denoted by NH_a, is the researcher hypothesis, similarly to the classical statistics.

In our particular case, we use the following Neutrosophic Hypothesis form:

$NH_0: \mu \in [a, b]$

$NH_a: \mu > b$

Where μ is the population weighted average score (WAS_i).

The z-critical value, will be calculated by the equation[30] :

$$z = \frac{\bar{x} - [a, b]}{s/\sqrt{n}} \tag{5}$$

A Neutrosophic Level of Significance α, [31]which may be a set, not necessarily a crisp number as in classical statistics. For this research we will assume the set of asymptotic significance level, $[0.95, 0.99]$, which implies the set $\alpha_N = [0.01, 0.05]$.

3 Results

A group of fifteen experts in the field of study was selected for the application of the Neutrosophic TOPSIS technique. They are free practice lawyers and public defenders from the Public Defender's Office in the Criminal Area of the Babahoyo canton, registered with the Los Ríos Bar Association, 40% of which, are women.

The lawyers and judges surveyed from the city of Babahoyo are professionals with vast experience in their profession. They alleged active and repeated participation in trials where the right to the legal benefit of Conditional Suspension of Sentence was invoked. Hence, their criteria are considered as key resources to support the results of this research.

After the application of the survey, preliminary statistical data on the results of the study were obtained, which are shown in the following table of frequencies.

Linguistic term	Frequencies				
	Statement 1	Statement 2	Statement 3	Statement 4	Statement 5
Extremely High (EH)	14	11	12	14	16
Very Very High (VVH)	12	14	15	14	17
Very High (VH)	14	15	18	17	16
High (H)	10	8	7	10	8
Medium High (MH)	10	12	8	5	3
Medium (M)	-	-	-	-	-
Medium Low (ML)	-	-	-	-	-
Low (L)	-	-	-	-	-
Very Low (VL)	-	-	-	-	-
Very Very Low (VVL)	-	-	-	-	-
Extremely Low (EL)	-	-	-	-	-
Total	**60**	**60**	**60**	**60**	**60**

Table 3. Frequency table

As we can see, all the results are higher than "Medium High" (MH). Therefore, it can be stated that the selected sample grants a high value to the proposal.

In order to avoid the use of aggregation functions in this work, we proceeded to calculate that of each of the responses given by the respondents and this was summarized in figure 1.
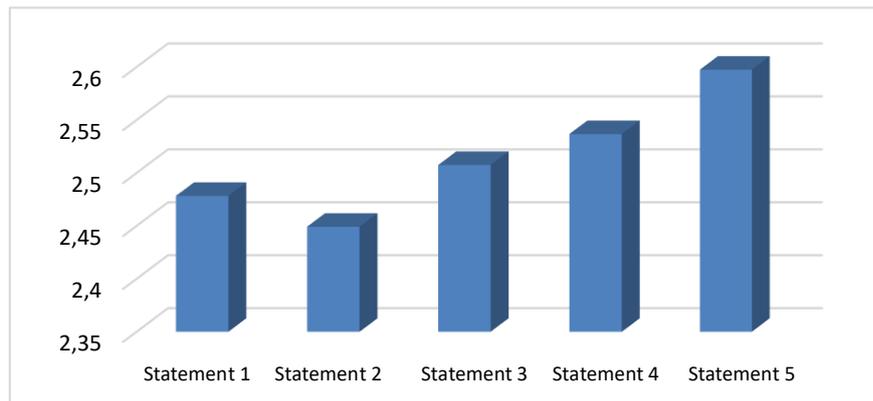

Figure 1. Weighted average score

In all cases a weighted average value of the score obtained, was higher than 2.44, which confirms the conclusion drawn from the frequency table (Table 3). In the case of statement number 5, it has the highest value of all statements, and it is can be qualified, at sample level, as evaluated with a very high importance, according to table 2.

In order to validate the proposal at a population level, the following test of a given neutrosophic hypothesis was proposed setting $\alpha_N = [0.01\,,0.05]$.

$NH_0: \mu \in [0\,,1.85]$
$NH_a: \mu > 1.85$

The following is the result of the test for statement number 5 of the applied survey.

Applying the decision criterion:

Reject $NH_0\ if\ min\{z - critical\} > \max\{Z_{1-\alpha_N}\}$, applying (5), was obtained $Z = 10.6 > \max\{Z_{1-\alpha_N}\} = 2.326$, so the decision to reject NH_0 for the significance level $\alpha_N = [0.01\,,0.05]$.

Similar results were obtained for the rest of the elements submitted to the specialists' criteria. Therefore, it can be affirmed that, at the population level, both the argumentative elements and the proposed reform to Article 630 will have a positive acceptance among the legal professionals of the city of Babahoyo.

Conclusions

The application of the Neutrosophic Hypothesis Test, allowed positively validating the result of this research with a level of significance of up to 99%.

The proposed reform to article 630 of the Integral Organic Penal Code and the argumentation of it have a high relevance for the lawyers and judges of the city of Babahoyo.

The reform proposed would help those who have been victims because their relatives have died as a result of a crime and the offenders take advantage of the conditional suspension of the sentence. The victims are expressly dissatisfied with the expected retribution for the loss they suffered.

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