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A Neutrosophic Model for Assessing the Impact of Artificial Intelligence on Civil Liability

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Abstract. The creation of Artificial Intelligence (AI) tools has grown exponentially in recent years. The number of these tools, their capabilities to solve problems and the number of people who use them are increasing rapidly. This constitutes a positive advance for humanity; however, there is also a negative side that can arise from its inappropriate use. To avoid the problems that may arise with the improper use of AI, it is necessary to have a regulatory legal framework that offers the guidelines to follow for evaluating the AI tools that arise and the civil and criminal consequences for those who fail to comply with what is established. This is an extremely complex problem since AI is constantly changing at a faster pace than lawyers understand the subject and the changes in the laws that must be applied. In our case, Ecuadorian legislation is not sufficiently prepared to face the problem, there is indeterminacy that manifests itself in the legal loopholes where some individuals can get away with it or be unfairly convicted. This paper proposes a model to help calculate the impact of AI on civil liability, especially in the legal system. Neutrosophic logic and other tools from this discipline are specifically used because they allow the explicit representation and calculation of the indeterminacy that is part of this problem that occurs in real life.

Keywords: Artificial Intelligence (AI), Civil Liability**,** Neutrosophic Logic, n- norm, n-conorm, neutrosophic existential quantifier, neutrosophic universal quantifier.

1 Introduction

Artificial Intelligence is mainly made up of computer programs that perform tasks that solve problems as natural intelligence such as human intelligence would do. Although this is a discipline with several decades of development, its use has now become popular, to the point of becoming part of our daily lives. The advantages that this discipline offers for the development of humanity and the personal support it provides to people in their daily and professional lives are undeniable.

However, there are dangers in its use that cannot be ignored. Artificial Intelligence can create advantages for some individuals over others because when it is misused, someone can be harmed. It can also be used to violate ethical principles or lend itself to criminal acts. That is why national and international regulatory frameworks are needed to guarantee the proper use of this tool. This regulatory framework is a challenge for the legislation of each country and international legislation since these are not crimes that are easy to establish.

Formally, the regulation of Artificial Intelligence consists of developing public sector policies and laws that promote and regulate the use of AI. This is an emerging issue, even in the so-called developed countries, where this type of tool is most developed, which usually requires technology and trained personnel for its generation. In particular, we have regulations developed in countries such as the United States and the members of the European Union. In addition, with the expansion of the Internet worldwide and other technologies that allow communication between individuals from different countries, it is essential to create laws within international organizations such as the IEEE or the OECD.

Regulation is seen as necessary to foster AI and also to manage the associated risks. Regulators should play a leading role in creating AI tools that adhere to trustworthiness principles, as well as take responsibility for mitigating the risks associated with these tools. Regulation of AI through mechanisms such as review boards can also be seen as a social means of addressing the problem of AI governance.

There have been proposals for both “hard law” and “soft law” approaches to regulating AI. Some legal scholars have pointed out that “hard law” approaches to AI regulation have substantial challenges. Among the challenges is that AI technology is evolving rapidly, leading to a problem where traditional laws and regulations often cannot keep up with emerging applications, their associated risks and benefits. Similarly, the diversity of AI applications challenges existing regulatory agencies, which often have limited jurisdictional scope.

Alternatively, some legal scholars argue that soft law approaches to AI regulation hold promise because these laws can be more flexibly tailored to meet the needs of emerging and evolving AI technology and nascent applications. However, soft law approaches often lack substantial enforcement potential.

AI regulation is a positive social means of managing the problem of AI control in such a way as to ensure long-term beneficial AI. On the other hand, responses such as doing nothing or prohibiting it are impractical and even counterproductive. A useful strategy is the creation of national and international review committees, involving members of society, academics, scientists, and ethics committees specialized in the subject, among other groups of people, where the appropriate use of each AI tool is discussed.

There are currently regulatory gaps and legal uncertainties in Ecuador regarding the use of Artificial Intelligence. There is no totally clear legislation in our country where this problem is addressed effectively. Several factors cause this, including that it is a very new topic to deal with, it represents a challenge for Ecuadorian legal specialists because it has technological and scientific foundations that are not easy to understand, it has an ethical basis of considerable complexity, and there is considerable uncertainty about how each tool created can behave, which grows every day in quantity and complexity. However, Ecuador must prepare itself legally for this avalanche to guarantee a regulation that is fair for all.

The objective of this article is to design a model that measures how specific regulations in the Ecuadorian regulatory framework influence the attribution of civil liability derived from the use of Artificial Intelligence, considering technological advances and their potential impact on compliance with current legal rights and obligations. This model can be a way to support our legal representatives to organize the approach to this problem effectively. Likewise, the model is susceptible to automation and therefore to socialization, improvement, and interaction with users and society in general.

Neutrosophic Logic is an ideal tool [1-10]. It provides a proposition with the propositional calculation of a triad of values, one of truth, one of indeterminacy, and one of falsehood. This evaluation explicitly incorporates a degree of indeterminacy that exists in the legal loopholes that are seen in Ecuadorian laws. This is completed by the proven certainties of the capacity for justice that these legislations present, as well as the certainties of inability to resolve others.

This paper is divided into a Materials and Methods section below, where the main concepts of Neutrosophic Logic are explained. The section that follows the second one contains the presentation of the model and an illustrative example. The last section is devoted to giving conclusions.

2 Materials and Methods

This section is dedicated to exposing the main concepts of neutrosophic logic [1, 4].

Definition 1 ([1, 4, 11])**.** Given X, a universe of discourse containing elements or objects. A is a *neutrosophic set* if it has the form: $A = \{(x: T_A(x), I_A(x), F_A(x)),\ x \in X\}$, where $T_A(x), I_A(x), F_A(x) \subseteq]^-0, 1^+[$, i.e., they are three functions over either the standard or nonstandard subsets of $]^-0, 1^+[$. $T_A(x)$ represents the degree of membership of x to A, $I_A(x)$ represents its degree of indeterminacy, and $F_A(x)$ its degree of non-membership. They do not satisfy any restriction, i.e., $\forall x \in X,\ ^-0 \leq \inf T_A(x) + \inf I_A(x) + \inf F_A(x) \leq \sup T_A(x) + \sup I_A(x) + \sup F_A(x) \leq 3^+$.

Another particular definition is that of a *single-valued neutrosophic set*, which is formally defined as follows:

Definition 2 ([1, 4, 11])**.** Given X, a universe of discourse that contains elements or objects. A is a *single-valued neutrosophic set* (SVNS) if it has the form: $A = \{(x: T_A(x), I_A(x), F_A(x)), x \in X\}$, where $T_A(x), I_A(x), F_A(x) \in [0, 1]$. $T_A(x)$ represents the degree of membership of x to A, $I_A(x)$ represents its degree of indeterminacy, and $F_A(x)$ its degree of non-membership. $\forall x \in X, 0 \leq T_A(x) + I_A(x) + F_A(x) \leq 3$.

So, SVNS is derived from the definition of neutrosophic sets.

In neutrosophic set theory, a lattice can be defined as follows:

Given the universe of discourse X and $x(T_x, I_x, F_x)$, $y(T_y, I_y, F_y)$ two SVNS, we say that $x \leq_N y$ if and only if $T_x \leq T_y$, $I_x \geq I_y$ and $F_x \geq F_y$, $(X, \leq_N)$ is a poset. Whereas, $(L, \wedge, \vee)$ is a lattice, because it is a triple direct product of lattices [11, 12]. .$x \wedge y = (\min\{T_x, T_y\},\ \max\{I_x, I_y\}, \max\{F_x, F_y\})$ and $x \vee y = (\max\{T_x, T_y\}, \min\{I_x, I_y\}, \min\{F_x, F_y\})$. Moreover, it is easy to prove that it is complete.

Let us remark that this definition is valid for interval-valued neutrosophic sets when we substitute their operators with interval-valued operators.

See also that there exist two special elements, viz., $0_N = (0,1,1)$ and $1_N = (1,0,0)$, which are the infimum and the supremum, respectively, of every SVNS concerning $\leq_N$.

Given two neutrosophic sets, A and B, three basic operations over them are the following, [1, 4 ,11]:

1. $A \cap B = A \wedge B$ (Conjunction),

2. $A \cup B = A \vee B$ (Disjunction),

3. $\overline{A} = (F_A, 1 - I_A, T_A)$ (Complement).

Definition 3 ([11, 13, 14])**.** A *neutrosophic norm* or *n-norm* N_n, is a mapping N_n: $(]^-0,1^+[\times]^-0,1^+[\times]^-0,1^+[)^2 \rightarrow]^-0,1^+[\times]^-0,1^+[\times]^-0,1^+[$, such that $N_n\left(x(T_x, I_x, F_x), y(T_y, I_y, F_y)\right) = (N_nT(x,y), N_nI(x,y), N_nF(x,y))$, where N_nT means the degree of membership, N_nI the degree of indeterminacy, and N_nF the degree of non-membership of the conjunction of both, x and y.

For every x, y, and z belonging to $]^-0,1^+[\times]^-0,1^+[\times]^-0,1^+[$, N_n must satisfy the following axioms:

1. $N_n(x, 0_N) = 0_N$ and $N_n(x, 1_N) = x$ (Boundary conditions),
2. $N_n(x,y) = N_n(y,x)$ (Commutativity),
3. If $x \leq_N y$, then $N_n(x,z) \leq_N N_n(y,z)$ (Monotonicity),
4. $N_n(N_n(x,y),z) = N_n(x, N_n(y,z))$ (Associativity).

Definition 4 ([11, 13, 14])**.** A *neutrosophic conorm* or *n- conorm* N_c, is a mapping N_c: $(]^-0,1^+[\times]^-0,1^+[\times]^-0,1^+[)^2 \rightarrow]^-0,1^+[\times]^-0,1^+[\times]^-0,1^+[$, such that $N_c\left(x(T_x, I_x, F_x), y(T_y, I_y, F_y)\right) = (N_cT(x,y), N_cI(x,y), N_cF(x,y))$, where N_cT means the degree of membership, N_cI the degree of indeterminacy and N_cF the degree of non-membership of the disjunction of x with y.

For every x, y, and z belonging to $]^-0,1^+[\times]^-0,1^+[\times]^-0,1^+[$, N_c must satisfy the following axioms:

1. $N_c(x, 0_N) = x$ and $N_c(x, 1_N) = 1_N$ (Boundary conditions).
2. $N_c(x,y) = N_c(y,x)$(Commutativity).
3. If $x \leq_N y$, then $N_c(x,z) \leq_N N_c(y,z)$(Monotonicity).
4. $N_c(N_c(x,y),z) = N_c(x, N_c(y,z))$(Associativity).

A Singled-valued neutrosophic negator is defined as follows:

Definition 5 ([11, 13, 14])**.** A *single-valued Neutrosophic negator* is a decreasing unary neutrosophic operator $N_N: [0,1]^3 \longrightarrow [0,1]^3$, satisfying the following boundary conditions:

1. $N_N(0_N) = 1_N$.
2. $N_N(1_N) = 0_N$.

It is called *involutive* if and only if $N_N(N_N(x)) = x$ for every $x \in [0,1]^3$.

In the following, we show the neutrosophic negators that we shall consider here, extracted from the literature [11]. Given an SVNS A (T_A, I_A, F_A), we have:

1. $N_N((T_A, I_A, F_A)) = (1 - T_A, 1 - I_A, 1 - F_A)$, $N_N((T_A, I_A, F_A)) = (1 - T_A, I_A, 1 - F_A)$, $N_N((T_A, I_A, F_A)) = (F_A, I_A, T_A)$ and $N_N((T_A, I_A, F_A)) = (F_A, 1 - I_A, T_A)$ (Involutive negators).
2. $N_N((T_A, I_A, F_A)) = \left(F_A, \frac{F_A + I_A + T_A}{3}, T_A\right)$ and $N_N((T_A, I_A, F_A)) = \left(1 - T_A, \frac{F_A + I_A + T_A}{3}, 1 - F_A\right)$ (Non-involutive deniers).

Definition 6 ([11, 15, 16]). A *single-valued neutrosophic implicator* is an operator $I_N: [0,1]^3 \times [0,1]^3 \rightarrow [0,1]^3$ which satisfies the following conditions, for all $x, x', y, y' \in [0,1]^3$:

1. If $x' \leq_N x$, then $I_N(x,y) \leq_N I_N(x',y)$,
2. If $y \leq_N y'$, then $I_N(x,y) \leq_N I_N(x,y')$,
3. $I_N(0_N, 0_N) = I_N(0_N, 1_N) = I_N(1_N, 1_N) = 1_N$,

4. $I_N(1_N, 0_N) = 0_N$.

Herein we use the term neutrosophic implicator or n- implicator to mean single-valued Neutrosophic implicator.

It can satisfy the following properties for every $x, y, z \in [0,1]^3$:

1. $I_N(1_N, x) = x$ (Neutrality principle),
2. $I_N(x, y) = I_N(N_{IN}(y), N_{IN}(x))$, where $N_{IN}(x) = I_N(x, 0_N)$ is an n-negator (Contrapositivity),
3. $I_N(x, I_N(y, z)) = I_N(y, I_N(x, z))$ (Interchangeability principle),
4. $x \leq_N y$ if and only if $I_N(x, y) = 1_N$ (Confinement principle),
5. I_N is a continuous mapping (Continuity).

Given the triple $n = (t, i, f)$ we could need to convert n into a real value using the following formula of the *Score function* [17]:

$$\mathcal{S}(n) = \frac{2+t-i-f}{3} \qquad (1)$$

3 The Model

This section is dedicated to presenting the basis of the proposed model. To do this, the three basic variables for carrying out the measurements are defined, which are summarized in Table 1:

Variable	Dimension
Legal regulation	Clear laws
	Regulatory ambiguities
	Legal loopholes
Civil liability	AI-based cases solved
	Areas where there are no precedents
	Cases where liability could not be established
Social and ethical impact	Recognized benefits
	Ethical or moral dilemmas still without consensus
	Potential damages

Table 1. Variables used in the model and their dimensions.

The variable "Legal regulation" denoted by R corresponds to the triad $NR = (T_R, I_R, F_R)$ defined as follows:

T_R: Proportion of clear laws,

I_R: Normative ambiguities,

F_R: Legal loopholes.

The variable "Civil liability" denoted by C corresponds to the triad $NC = (T_C, I_C, F_C)$ defined as follows:

T_C: Proportion of cases solved based on AI,

I_C: Areas where there are no precedents,

F_C: Proportion of cases in which liability could not be established.

The variable "Social and ethical impact" denoted by S corresponds to the triad $NS = (T_S, I_S, F_S)$ defined as follows:

T_S: Recognized benefits,

I_S: Ethical or moral dilemmas still without consensus,

F_S: Potential damage.

These variables are further broken down as follows:

Suppose n is the number of civil laws in Ecuador, let us denote each of them by l_i with $i = 1, 2, \dots, n$. Then let us denote by $NR_i = (T_{R_i}, I_{R_i}, F_{R_i})$ the variable "Legal regulation" for the ith civil law; $NC_i = (T_{C_i}, I_{C_i}, F_{C_i})$ the results of "Civil liability" for the ith law and finally $NS_i = (T_{S_i}, I_{S_i}, F_{S_i})$ is the result of measuring the "Social and ethical impact" for the ith civil law.

Note that with the help of the benefits of neutrosophy, we can have triads such as $(1,0,0)$ as meaning true, $(0,0,1)$ meaning false, and also $(0,1,0)$ meaning indeterminate, and so on.

One of the challenges of the proposed model is the initialization and updating of the values of the proposed triads. The variable C is measured objectively by the cases obtained; however, it is necessary to update it. For this reason, the solution of conflicts related to this variable in each of the civil laws should be included in a database.

For R and S, they are initialized and updated subjectively, with the help of a group of expert lawyers specialized in civil law. Let us denote these experts by e_j with $j = 1, 2, \dots, m$. Then, each of them must give an evaluation at a given time on these variables, let us denote it by $NR_{ij} = \left(T_{R_{ij}}, I_{R_{ij}}, F_{R_{ij}}\right)$ and $NS_{ij} = \left(T_{S_{ij}}, I_{S_{ij}}, F_{S_{ij}}\right)$. Let us also consider that the weight or level of expertise of each of them is measured by the following table:

Level of Expertise	**Associated weight (w_j)**
Very Low	0.1
Low	0.3
Middle	0.5
High	0.7
Very High	0.9

Table 2. Relationship between the level of expertise on a linguistic scale and its associated weight in a real numerical value.

That is, each of the experts is evaluated in terms of knowledge and work experience concerning the variables R and S at the time the model is updated. It is preferred to consult experts with "High" and "Very High" levels of expertise. Then the following result is obtained for each of the laws calculated as the weighted arithmetic means:

$$NR_i = \left(\frac{\sum_{j=1}^{m} w_j T_{R_{ij}}}{\sum_{j=1}^{m} w_j}, \frac{\sum_{j=1}^{m} w_j I_{R_{ij}}}{\sum_{j=1}^{m} w_j}, \frac{\sum_{j=1}^{m} w_j F_{R_{ij}}}{\sum_{j=1}^{m} w_j}\right) \quad (2)$$

$$NS_i = \left(\frac{\sum_{j=1}^{m} w_j T_{S_{ij}}}{\sum_{j=1}^{m} w_j}, \frac{\sum_{j=1}^{m} w_j I_{S_{ij}}}{\sum_{j=1}^{m} w_j}, \frac{\sum_{j=1}^{m} w_j F_{S_{ij}}}{\sum_{j=1}^{m} w_j}\right) \quad (3)$$

For greater convenience in automating the model, these results are placed in a neutrosophic matrix (which can be a database) denoted by NM of order $n \times 3$, such that the ith component corresponds to the ith law evaluated in each column by the values NR_i, NS_i and NC_i in that order.

To perform the evaluation, two logical predicates are used, which are defined in formulas 4 and 5.

$$N = \forall_{i \in V}(NR_i \wedge_N NS_i) \wedge_N (NR_i \wedge_N NS_i \rightarrow_N NC_i) \quad (4)$$

$$P = \exists_{i \in V}(NR_i \wedge_N NS_i) \wedge_N (NR_i \wedge_N NS_i \rightarrow_N NC_i) \quad (5)$$

Let us explain each of these equations:

Both equations are defined for laws belonging to V which is the set of laws applicable to cases involving the use of AI. This prevents the predicate in Equation 4 from being evaluated too lowly. On the other hand, the predicate in Equation 4 is interpreted as a *modus ponens* variant for all laws in the set V and which are necessarily useful in "Civil Liability". The predicate defined in Equation 5 is a measure of the possibility that a law exists that beneficially influences "Civil Liability".

Aside from that, let us remember that $\wedge_N$ is the neutrosophic conjunction, $\rightarrow_N$ is the neutrosophic implication, $\forall_{i \in V} x_i = \wedge_{N_{i \in V}} x_i$ and $\exists_{i \in V} x_i = \vee_{N_{i \in V}} x_i$, where each x_i is a triad.

Now let us illustrate the model with an example.

Example 1. Let us suppose that Ecuadorian civil laws numbered 10, 15, and 24 are of interest to be applied in litigation related to the use of AI. After a thorough study of cases, the following numbers have been established:

$T_{C10} = 0.4$, $I_{C10} = 0.4$, $F_{C10} = 0.2$;

$T_{C15} = 0.6$, $I_{C15} = 0.2$, $F_{C15} = 0.2$;

$T_{C24} = 0.3$, $I_{C24} = 0.1$, $F_{C24} = 0.6$.

That is, we have $NC_{10} = (0.4,0.4,0.2)$, $NC_{15} = (0.6,0.2,0.2)$ and $NC_{24} = (0.3,0.1,0.6)$. As noted above, these values are obtained objectively.

Suppose then that the set of laws relating to the use of AI is $V = \{10, 15, 24\}$.

Now, let us take the set $E = \{e_1, e_2, e_3\}$, and each of them is evaluated as "High", "Very High", and "High" in their level of expertise, respectively. So, according to Table 2, the following weights are obtained, $w_1 = w_3 = 0.7$ and $w_2 = 0.9$.

The evaluations of each expert for the variables NR_i and NS_i are shown in Table 3.

Dimension/Expert	$\mathbf{e_1}$	$\mathbf{e_2}$	$\mathbf{e_3}$	Aggregated values
NR_{10}	(0.33, 0.25, 0.42)	(0.06, 0.73, 0.21)	(0.74, 0.09, 0.18)	(0.35, 0.39, 0.26)
NR_{15}	(0.36, 0.44, 0.2)	(0.29, 0.5, 0.21)	(0.37, 0.24, 0.4)	(0.34, 0.40, 0.26)
NR_{24}	(0.29, 0.45, 0.26)	(0.29, 0.09, 0.62)	(0.44, 0.2, 0.36)	(0.34, 0.23, 0.43)
NS_{10}	(0.6, 0.01, 0.4)	(0.13, 0.62, 0.25)	(0.47, 0.08, 0.45)	(0.38, 0.27, 0.36)
NS_{15}	(0.46, 0.12, 0.43)	(0.51, 0.27, 0.22)	(0.1, 0.52, 0.38)	(0.37, 0.30, 0.33)
NS_{24}	(0.17, 0.38, 0.45)	(0.59, 0.12, 0.29)	(0.07, 0.35, 0.58)	(0.30, 0.27, 0.42)

Table 3. Expert evaluation table for the variables "Legal regulation" and "Social and ethical impact". The last column shows the aggregated values using Equations 2 and 3.

Therefore, the resulting neutrosophic matrix NM is as follows:

$$NM = \begin{bmatrix} \vdots & \vdots & \vdots \\ (0.35, 0.39, 0.26) & (0.38, 0.27, 0.36) & (0.4, 0.4, 0.2) \\ \vdots & \vdots & \vdots \\ (0.34, 0.40, 0.26) & (0.37, 0.30, 0.33) & (0.6, 0.2, 0.2) \\ \vdots & \vdots & \vdots \\ (0.34, 0.23, 0.43) & (0.30, 0.27, 0.42) & (0.3, 0.1, 0.6) \\ \vdots & \vdots & \vdots \end{bmatrix}$$

The three components of Equations 4 and 5 to each of the laws are as follows as shown in Table 4:

Law/Predicate	$(\boldsymbol{NR_i} \wedge_N \boldsymbol{NS_i})$	$(\boldsymbol{NR_i} \wedge_N \boldsymbol{NS_i} \rightarrow_N \boldsymbol{NC_i})$	$(\boldsymbol{NR_i} \wedge_N \boldsymbol{NS_i}) \wedge_N (\boldsymbol{NR_i} \wedge_N \boldsymbol{NS_i} \rightarrow_N \boldsymbol{NC_i})$
l_{10}	$(0.35, 0.39, 0.36)$	$(0.4, 0.39, 0.2)$	$(0.35, 0.39, 0.36)$
l_{15}	$(0.34, 0.40, 0.33)$	$(0.6, 0.2, 0.2)$	$(0.34, 0.40, 0.33)$
l_{24}	$(0.34, 0.27, 0.43)$	$(0.43, 0.1, 0.34)$	$(0.34, 0.27, 0.43)$

Table 4. Components of Equations 3 and 4 are broken down.

Let us observe that the norm $(T_1, I_1, F_1) \wedge_N (T_2, I_2, F_2) = (\min(T_1, T_2), \max(I_1, I_2), \max(F_1, F_2))$ was used, the n-conorm $(T_1, I_1, F_1) \vee_N (T_2, I_2, F_2) = (\max(T_1, T_2), \min(I_1, I_2), \min(F_1, F_2))$, the neutrosophic negation $\neg_N(\mathrm{T}, \mathrm{I}, \mathrm{F}) = (\mathrm{F}, \mathrm{I}, \mathrm{T})$, and the neutrosophic implication $(T_1, I_1, F_1) \rightarrow_N (T_2, I_2, F_2) = \neg_N(T_1, I_1, F_1) \vee_N (T_2, I_2, F_2)$.

Finally, formulas 4 and 5 yield to:

$N = (0.34, 0.40, 0.43)$ and $P = (0.35, 0.27, 0.33)$. Both formulas can be converted to real numerical values using the score function (1), resulting in $\mathcal{S}(N) = 0.503$ and $\mathcal{S}(P) = 0.583$. It means that the possibility and need for having laws to resolve conflicts related to AI is more or less medium, neither low nor high.

Conclusion

This paper is dedicated to proposing a neutrosophic logic model to deal with the problem of legal disputes related to the issue of the inappropriate use of AI. The case of Ecuador is discussed. Specifically, two indices are calculated to measure how "Legal Regulation" and "Social and Ethical Impact" influence "Civil Liability". The indices indicate the need for this predicate and the existence of laws for this. We base ourselves on neutrosophic logic because it extends fuzzy logic to types of knowledge that are semantically impossible to represent in the preceding extensions of fuzzy logic. Specifically, the indeterminacy component is treated independently of the other components. This is a simple model to implement in software and if its automation is carried out, it will allow its extensive use, in addition to its improvement.

In future works, we will consider complesizing the modelization of this issue, where neutrosophic measures for legal reasoning are used [18, 19, 20]. This will allow users for easier updating of the matrix data NM, although, on the other hand, it will require the definition of neutrosophic measures, which will allow capturing the opinions of experts, including the evaluation of laws viewed as systems and not as isolated components. However, this may make the model more difficult to implement.

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