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Neutrosophic Approaches to Emotional Intelligence Measurement

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Abstract. Emotional intelligence has received considerable attention in recent research. Although it emerged as a topic in the 1990s, the majority of investigations have only surfaced in recent decades. Although it emerged as a topic in the 1990s, the majority of investigations have only surfaced in recent decades. Studies have suggested that individuals with higher emotional intelligence possess greater control over their abilities, and mental wellness, and are better equipped to find quick solutions to the issues they encounter. This study introduces a method of measuring emotional intelligence levels in people based on neutrosophy. The study identifies the primary challenges found in the components of emotional intelligence among citizens from Ecuador and outlines the necessary steps for addressing them.

Keywords: Emotional intelligence, regulation, emotions, skills, neutrosophy.

1. Introduction

Emotional intelligence (EI) proves to be fundamental in making relationships and exchanges successful and beneficial for all involved. The application of emotional intelligence in relationships with others is built through the promotion of effective communication, fostering interpersonal interaction, and mutual support, both to others and to oneself.

In the last decade, it has become common among various professionals, including educators, to address the introduction of the term "emotional intelligence" in their conversations, considering that this concept is relatively recent from their perspectives. For the general audience, the notion of EI gained popularity with the presentation of psychologist and journalist Daniel Goleman in 1995 [1], through his book entitled "Emotional Intelligence", detailing the precise criteria that contributed to the development of this field.

Currently, there is a significant amount of research that suggests that emotional intelligence is the basis of social and emotional skills, as well as an indicator of success in both educational and professional settings. This can be seen in the ability to regulate, identify, and use one's own emotions, as well as the ability to understand and show empathy towards the emotions of others, which contributes to the mental health and quality of life of individuals. In other words, people with a high level of emotional intelligence tend to assume leadership roles, have a greater ability to cope with difficult situations, and demonstrate outstanding work performance.

As for EI, a variety of conceptualizations have been generated that are associated with personal maturity, wisdom, or reasonableness, terms that are used to determine that a person possesses ample knowledge to carry out the resolution of problems based on his or her experience [2]. According to [3], it is defined as "the ability to understand and manage men and women, boys and girls, and to act wisely in human relations".

In these three decades, the impact of Goleman's book on society has been so profound that most people interested in emotional education associate emotional intelligence with Goleman's outreach perspective, often ignoring the more scientifically grounded view of emotional intelligence, as well as such notable researchers as Mayer and Salovey. When examining Goleman's proposal, it becomes evident that it transcends the concept of emotional intelligence and encompasses other personal characteristics more broadly, which are sometimes confused with what in psychology are called personality traits. In the specialized literature, models similar to Goleman's are described as mixed models [4]. Mixed models conceive emotional intelligence as a fusion of mental skills such as emotional perception or emotional mastery, together with personality attributes such as assertiveness, self-esteem, independence, and optimism. Some of these approaches even incorporate emotional states such as happiness and more complex skills such as leadership and the ability to work in a team.

According to social scientists Salovey and Mayer, emotional intelligence is conceived as a true form of intelligence that is based on the ability to use emotions adaptively to adapt to the environment and solve challenges.

From this theoretical perspective, EI consists of four basic skills: emotional perception and expression, emotional facilitation, emotional understanding, and emotional regulation.

Salovey and Mayer conceive EI as a processual and circular model in which each of the basic skills provides information to the next one to continue the process and provide a solution to a specific demand or situation.[5]

The most extensive and detailed definition of EI from the Mayer and Salovey model would be:

Emotional intelligence involves the ability to perceive, evaluate, and express emotions accurately; the ability to access and/or generate feelings that facilitate thinking; the ability to understand emotion and emotional knowledge, and the ability to regulate emotions that promote emotional and intellectual growth [6].

In this same direction, according to Ortiz and Rodriguez [7], emotional skills are promoters of mental processes and act in favor of concentration and control of stressful situations, as well as self-motivation, allowing them to satisfactorily carry out their studies and academic tasks.

Likewise, those who acquire correct levels of Emotional Intelligence develop skills to adequately manage feelings such as anxiety and depression, as well as an increase in self-esteem, and satisfaction with the work done and the effort made, since they manage to deploy sufficient strategies to control emotions and understand the events, presenting a faster and more effective recovery from negative moods [8, 9].

In the field of education, it has been observed that teachers with a high level of emotional intelligence are those who focus on finding solutions. They are noted for their optimism and positive attitude, which enables them to deal with constant challenges in their work. Since education professionals face continuous challenges, they must develop their emotional intelligence to manage negative emotions and replace them with greater emotional engagement. This has a positive impact on their ability to improve performance, strengthen interpersonal relationships, and ultimately contribute to effective job performance and high-quality education. In addition, it helps them to make appropriate decisions even in stressful situations.

EI can be manifested in different ways by individuals, but its core focuses on the personality essentials that show the level of development shown by the individual and how he or she manages to use EI in his or her actions to solve everyday life situations. A neutrosophic procedural analysis is proposed for the measurement of EI based on the experiences acquired by the participants.

2 Materials and methods

2.1 Preliminaries

Definition 1: Let X be a space of points (objects) with generic elements in X denoted by x. A Single-Valued Neutrosophic Set (SVNS) A on X is characterized by the truth membership function, T_A (x), the indetermination membership function, I_A (x), and the falsity membership function F_A (x). Then, an SVNS A can be denoted by A=(x, TA(x), IA(x), FA(x) x ∈ X), where TA(x), IA(x), FA(x) ∈ [0.1] for each point x in ≤ 3. Therefore, the sum of T_A(x), I_A(x) and F_A(x) satisfies the condition $0 \leq T_A(x)$, +(x)+F_A(x)≤ 3. For convenience, an SVN number is denoted by A = (a, b, c), where a, b, c ∈ [0,1] a + b + c ≤ 3 [10].

Definition 2: Let A_1= (a_1, b_1, c_1) and A_2= (a_2, b_2, c_2) be two SVN numbers, then the sum between A_1 and A_2 is defined as follows:

$$A_1 + A_2 = (a_1 + a_2 - a_1a_2, b_1b_2, c_1c_2) \quad (1)$$

Definition 3: Let A1= (a1,b1,c1) and A2= (a2,b2,c2) be two SVN numbers, then the multiplication between A1 and A2 is defined as follows:

$$A_1 * A_2 = (a_1a_2, b_1 + b_2 - b_1b_2, c_1 + c_2 - c_1c_2) \quad (2)$$

Definition 4: Let A = (a, b, c) be an SVN number and $\lambda \in \mathbb{R}$ an arbitrary positive real number, then:

$$\lambda A = \left(1 - (1 - a)^{\lambda}, b^{\lambda}, c^{\lambda}\right), \lambda > 0 \quad (3)$$

Definition 5: Let A={A_1, A_2, …, A_n } be a set of n SVN numbers, where A_j= (a_j, b_j, c_j) (j= 1, 2, …, n). The single-valued neutrosophic weighted average operator on them is defined by:

$$\sum_{j=1}^{n} \lambda_j A_j = \left(1 - \prod_{j=1}^{n} (1 - a_j)^{\lambda_j}, \prod_{j=1}^{n} b_j^{\lambda_j}, \prod_{j=1}^{n} c_j^{\lambda_j}\right) \quad (4)$$

Where j is the weight of A_j (j= 1, 2, …, n), $\lambda_j \in [0,1]$ and $\sum_{j=1}^{n} \lambda_j = 1$.

Definition 6: Let $A^* = \{A_1^*, A_2^*, \ldots, A_n^*\}$ be a vector of n SVN numbers, such that Aj* = (a*,b*,c) (j= 1, 2, …, n), and B_i={B_{i1},B_{i2},…,B_{im} } (i= 1, 2, …, m), (j= 1, 2, …, n). Then, the separation measure between Bi and

A* based on the Euclidean distance is defined as follows:

$$s_i = \left(\frac{1}{3} \sum_{j=1}^{n} \left(\left| a_{ij} - a_j^* \right| \right)^2 + \left(\left| b_{ij} - b_j^* \right| \right)^2 + \left(\left| c_{ij} - c_j^* \right| \right)^2 \right)^{\frac{1}{2}} \quad (i = 1,2, \dots, m) \tag{5}$$

Definition 7: Let A = (a, b, c) be a single-valued neutrosophic number, a scoring function S of a single-valued neutrosophic number, based on the degree of truth membership, the degree of indeterminacy membership, and the degree Falsehood membership is defined by:

$$S(A) = \frac{1+a-2b-c}{2} \tag{6}$$

Where: $S(A) \in [-1,1]$

The scoring function S reduces to the scoring function proposed by [10] if b = 0 and a + b ≤ 1.

A linguistic variable is a variable whose values are characterized by words or phrases rather than numbers in a natural or artificial language. The value of a linguistic variable is expressed as an element of its set of terms. The concept of linguistic variables is very useful for solving decision-making problems with complex content. For example, performance ratings of alternatives can be expressed in qualitative attributes using linguistic variables such as very important, important, medium, unimportant, very unimportant, etc. Such linguistic values can be represented using single-valued neutrosophic numbers [11]. In the case of this research, the linguistic variables to be used are shown below:

Table 1: Neutrosophic values of linguistic terms. Adapted from: Kilic and Yalsin [11]**.**

Linguistic term	SVNSs
Very No Influential / (VNI)	(0.9;0.1;0.1)
No Influential /(NI)	(0.75;0.25;0.20)
Moderately Influential /(MI)	(0.50;0.5;0.50)
Influential /(I)	(0.35;0.75;0.80)
Very Much Influential /(VMI)	(0.10;0.90;0.90)

As one of the MCDM methods that consider both the distance of each alternative from the positive ideal and the distance of each alternative from the negative ideal point, that is, the best alternative must have the shortest distance from the positive ideal solution (PIS). and the longest distance from the negative ideal. In this research, it will be used to assess by specialists the level of influence exerted by the alternatives made in the process [12].

In this study, there are 5 criteria and 13 components that are classified according to the TOPSIS method.

2.2 TOPSIS

In the method, there are *k*-decision makers, m-alternatives and n-criteria. *k*-Decision makers evaluate the importance of m-alternatives under n-criteria and rank the performance of n-criteria with respect to linguistic statements converted to single-valued neutrosophic numbers [13]. Here, decision makers often use a set of weights such that W = (very important, important, medium, unimportant, and very unimportant), and importance weights based on Single-Valued Neutrosophic Values of the linguistic terms are given in Table 1.

On the other hand, the used TOPSIS method for SVNS consists of the following: Assuming that A={ρ_1, ρ_2, …, ρ_m} is a set of alternatives and G={β_1, β_2, …, β_n} is a set of criteria, The following steps will be carried out:

Step 1: *Determine the relative importance of experts*. To do this, the specialists evaluate according to the linguistic scale that appears in Table 1, and the calculations are carried out with their associated SVNN. Let $A_t = (a_t, b_t, c_t)$ be the SVNS corresponding to the *t-th* decision maker ($t = 1, 2, \dots, k$). The weight is calculated by the following formula:

$$\delta_t = \frac{a_t + b_t\left(\frac{a_t}{a_t + c_t}\right)}{\sum_{t=1}^{k} a_t + b_t\left(\frac{a_t}{a_t + c_t}\right)} \quad where: \delta_t \geq 0 \; and \sum_{t=1}^{k} \delta_t = 1 \tag{7}$$

Step 2: *Construction of the neutrosophic decision matrix of aggregated single values*. This matrix is defined by $D = \sum_{t=1}^{k} \lambda_t D^t$, where $(i = 1,2,..,m;\ j = 1,2,...,n)$ and it is used to aggregate all individual evaluations. d_{ij} is calculated as the aggregation of the evaluations given by each expert $(u_{ij}^t, r_{ij}^t, v_{ij}^t)$, using the weights λ_t of each one with the help of equation 7. In this way, a matrix D = (d_{ij})$_{ij}$ is obtained, where each d_{ij} is an SVNN.

Step 3: *Determination of Criteria Weight*. Suppose that the weight of each criterion is given by $W = (w_1, w_2, \dots, w_n)$, where w_j denotes the relative importance of the criterion $\lambda_t w_j^t = (a_j^t, b_j^t, c_j^t)$. If it is the evaluation of the criterion λ_t by the *t-th* expert, then equation 8 is used to aggregate the w_j^t with the weights λ_t [14-17-18].

Step 4: *Construction of the single-valued weighted average neutrosophic decision matrix* with respect to the criteria.

$$D^* = D * W, where\ d_{ij} = (a_{ij}, b_{ij}, c_{ij}) \tag{8}$$

Step 5: *Calculation of the ideal positive and negative SVNN solutions.* The criteria can be classified as cost or benefit type. Let G_1 be the set of benefit-type criteria and G_2 the cost-type criteria. The ideal alternatives will be defined as follows [15-19]:

The positive ideal solution corresponding to G_1.

$$\rho^+ = a_{\rho+w}(\beta_j), b_{\rho+w}(\beta_j), ac_{\rho+w}(\beta_j) \tag{9}$$

The negative ideal solution corresponding to G_2.

$$\rho^- = (a_{\rho-w}(\beta_j), b_{\rho-w}(\beta_j), ac_{\rho-w}(\beta_j)) \tag{10}$$

Where:

$$a_{\rho+w}(\beta_j) = \begin{cases} max_i a_{\rho iw}(\beta_j), si\ j \epsilon G_1 \\ min_i a_{\rho iw}(\beta_j), si\ j \epsilon G_2, \end{cases} \qquad a_{\rho-w}(\beta_j) = \begin{cases} min_i a_{\rho iw}(\beta_j), si\ j \epsilon G_1 \\ max_i a_{\rho iw}(\beta_j), si\ j \epsilon G_2, \end{cases}$$

$$b_{\rho+w}(\beta_j) = \begin{cases} max_i b_{\rho iw}(\beta_j), si\ j \epsilon G_1 \\ min_i b_{\rho iw}(\beta_j), si\ j \epsilon G_2, \end{cases} \qquad b_{\rho-w}(\beta_j) = \begin{cases} min_i b_{\rho iw}(\beta_j), si\ j \epsilon G_1 \\ max_i b_{\rho iw}(\beta_j), si\ j \epsilon G_2, \end{cases}$$

$$c_{\rho+w}(\beta_j) = \begin{cases} max_i c_{\rho iw}(\beta_j), si\ j \epsilon G_1 \\ min_i c_{\rho iw}(\beta_j), si\ j \epsilon G_2, \end{cases} \qquad c_{\rho-w}(\beta_j) = \begin{cases} min_i c_{\rho iw}(\beta_j), si\ j \epsilon G_1 \\ max_i c_{\rho iw}(\beta_j), si\ j \epsilon G_2, \end{cases}$$

Step 6: *Calculation of the distances to the positive and negative SVNN ideal solutions.* With the help of equations 11 and 12, the following equations are calculated:

$$d_i^+ = \left(\frac{1}{3} \sum_{j=1}^{n} \left\{ \left(a_{ij} - a_j^+\right)^2 + \left(b_{ij} - b_j^+\right)^2 + \left(c_{ij} - c_j^+\right)^2 \right\} \right)^{\frac{1}{2}} \tag{11}$$

$$d_i^- = \left(\frac{1}{3} \sum_{j=1}^{n} \left\{ \left(a_{ij} - a_j^-\right)^2 + \left(b_{ij} - b_j^-\right)^2 + \left(c_{ij} - c_j^-\right)^2 \right\} \right)^{\frac{1}{2}} \tag{12}$$

Step 7: *Calculation of the Coefficient of Proximity (CP).* The CP of each alternative is calculated with respect to the positive and negative ideal solutions.[15]

$$\widetilde{\rho_j} = \frac{s^-}{s^+ + s^-} \tag{13}$$

Where: $0 \leq \widetilde{\rho_j} \leq 1$.

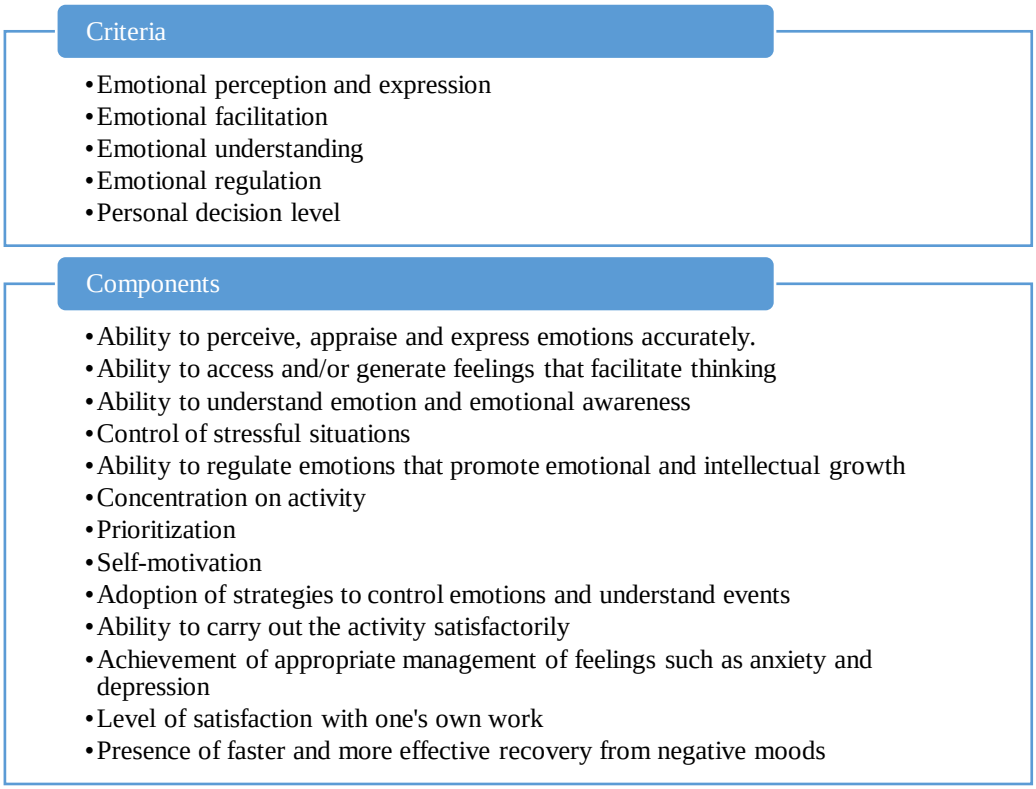
Step 8: *Determination of the order of the alternatives.* They are ordered according to the value of $\widetilde{\rho_j}$. The alternatives are ordered from highest to lowest, with the condition that $\widetilde{\rho_j} \rightarrow 1$ is the optimal solution [16], based on the results obtained in the surveys applied to five groups of people selected from different regions of Ecuador that have approximately the same characteristics.

3. Results and discussion

Emotional intelligence and its study constitute a starting point for the adaptation of treatment and modes of action at different times and spaces in the development of human life. The analysis of some components allows

to determine the essential elements to work on to enable better development of EI in each space. In some activities such as the work of teaching staff, this has special importance, allowing regulation based on permanent observation of their students. Similarly, it behaves when the person is in a group, where the action of each person influences the rest positively or negatively. To assess the main components within this process, 8 experts were selected, with a close relationship with the topic addressed and a vast experience in it. The criteria and components that were considered in the development of this research are shown in Figure 1.

Figure 1: Elements relevant to the investigation. Source: own elaboration.



To determine the relationship of the mentioned components with the criteria, it was necessary, in advance, to determine the weights of the components, through the NCM method set out in section 2.1, with the support of the 8 experts. Below is the adjacency matrix (see Table 2) where the different relationships between them were determined through the values of the relationships that correspond to the arithmetic mean, which served as the basis for calculating the values of $od(v_i)$ and $id(v_i)$ (see Table 3).

Table 2: Adjacency matrix. Source: own elaboration.

	C1	C2	C3	C4	C5	$\sum_{i=1}^{n} c_{ij}$
C1	0	0.8	0.6	0.8	1	3.2
C2	0.4	0	0.3	0.6	0.7	2.0
C3	0.8	0.7	0	0.7	1	3.2
C4	0.7	0.8	0.3	0	0.6	2.4
C5	0.2	0.8	0	0.3	0	1.3
$\sum_{i=1}^{n} c_{ji}$	2.1	3.1	1.2	2.4	3.3	

Table 3: Determination of corresponding values of $od(v_i)$ and $id(v_i)$. Source: own elaboration.

	C1	**C2**	**C3**	**C4**	**C5**	$\boldsymbol{od(v_i)}$
C1	0	0.421053	0.31579	0.421053	0.526316	1.68421053
C2	0.210526316	0	0.15789	0.315789	0.368421	1.05263158
C3	0.4210052632	0.368421	0	0.368421	0.526316	1.68421053
C4	0.368421063	0.421053	0.15789	0	0.315789	1.26315789
C5	0.105263158	0.421053	0	0.157895	0	0.68421053
$\boldsymbol{id(v_i)}$	1.10526316	1.63157895	0.63156895	1.26315789	1.73684211	

Once the values were determined, the centrality value was calculated (see Table 4) which was necessary to normalize for later use. The variables were classified as ordinary as $od(v_j) \neq 0$ and $id(v_j) \neq 0$. In a relevant way, it could be observed that emotional facilitation is the most important element to achieve the development of basic skills in interacting with people through the components of EI, by facilitating the development of the attitudes and modes of action of the person. rest of the group.

Table 4: Calculation of centrality $td(v_i)$, normalization of centrality, and classification of variables. Source: own elaboration.

$\boldsymbol{td(v_i)}$	$\boldsymbol{W_{td_i}}$	**Classification**
2.78947368	0.2	Ordinary
2.68421053	0.2107438	Ordinary
2.31578947	0.18181818	Ordinary
2.52631579	0.19834711	Ordinary
2.42105263	0.19008264	Ordinary

In the case of determining the components most influenced by the criteria previously stated, the application of the TOPSIS method was necessary. Initially, the weight of the groups of decision-makers established in Figure 1 was determined. Due to the relevance determined within the EI and their actions by the person who guides the activity, the five with the greatest weight were selected. The results are shown below (Table 5):

Table 5: Determination of the weight of the main components. Source: own elaboration.

	Group 1			Group 2			Group 3			Group 4			Group 5		
	a	**b**	**c**	**a**	**b**	**c**	**a**	**b**	**c**	**a**	**b**	**c**	**a**	**b**	**c**
Importance vector $\boldsymbol{\lambda_t}$	(0.10;0.90;0.90)			(0.35;0.75;0.80)			(0.35;0.75;0.80)			(0.10;0.90;0.90)			(0.35;0.75;0.80)		
Numerical importance	0.1646			0.2236			0.2236			0.1646			0.2236		

Next, it was necessary to consider the opinions of these groups, which were asked to fill out a questionnaire to evaluate components against criteria according to the neutrosophic linguistic scale determined in section 2.1 (see table 6), which gave way to the preparation of the single value criteria matrix (see table 7). The results shown below are the result of the mode of respondents' rankings.

Table 6: Evaluation of components according to criteria. Source: own elaboration.

	Group 1	Group 2	Group 3	Group 4	Group 5
	Perception and emotional expression				
P1	(0.50;0.5;0.50)	(0.50;0.5;0.50)	(0.50;0.5;0.50)	(0.50;0.5;0.50)	(0.35;0.75;0.80)
P2	(0.50;0.5;0.50)	(0.50;0.5;0.50)	(0.10;0.90;0.90)	(0.50;0.5;0.50)	(0.50;0.5;0.50)
P3	(0.75;0.25;0.2)	(0.35;0.75;0.80)	(0.75;0.25;0.2)	(0.75;0.25;0.2)	(0.75;0.25;0.2)
P4	(0.50;0.5;0.50)	(0.50;0.5;0.50)	(0.35;0.75;0.80)	(0.50;0.5;0.50)	(0.50;0.5;0.50)
P5	(0.50;0.5;0.50)	(0.50;0.5;0.50)	(0.10;0.90;0.90)	(0.50;0.5;0.50)	(0.10;0.90;0.90)

	Group 1	Group 2	Group 3	Group 4	Group 5
Perception and emotional expression					
			Emotional facilitation		
P1	(0.10;0.90;0.90)	(0.10;0.90;0.90)	(0.10;0.90;0.90)	(0.10;0.90;0.90)	(0.35;0.75;0.80)
P2	(0.10;0.90;0.90)	(0.35;0.75;0.80)	(0.10;0.90;0.90)	(0.10;0.90;0.90)	(0.10;0.90;0.90)
P3	(0.35;0.75;0.80)	(0.35;0.75;0.80)	(0.35;0.75;0.80)	(0.35;0.75;0.80)	(0.35;0.75;0.80)
P4	(0.10;0.90;0.90)	(0.10;0.90;0.90)	(0.35;0.75;0.80)	(0.10;0.90;0.90)	(0.35;0.75;0.80)
P5	(0.10;0.90;0.90)	(0.10;0.90;0.90)	(0.35;0.75;0.80)	(0.10;0.90;0.90)	(0.10;0.90;0.90)
			Emotional understanding		
P1	(0.10;0.90;0.90)	(0.10;0.90;0.90)	(0.35;0.75;0.80)	(0.10;0.90;0.90)	(0.35;0.75;0.80)
P2	(0.35;0.75;0.80)	(0.35;0.75;0.80)	(0.10;0.90;0.90)	(0.35;0.75;0.80)	(0.35;0.75;0.80)
P3	(0.10;0.90;0.90)	(0.50;0.5;0.50)	(0.10;0.90;0.90)	(0.10;0.90;0.90)	(0.10;0.90;0.90)
P4	(0.35;0.75;0.80)	(0.50;0.5;0.50)	(0.35;0.75;0.80)	(0.35;0.75;0.80)	(0.10;0.90;0.90)
P5	(0.35;0.75;0.80)	(0.35;0.75;0.80)	(0.35;0.75;0.80)	(0.35;0.75;0.80)	(0.50;0.5;0.50)
			Emotional regulation		
P1	(0.35;0.75;0.80)	(0.35;0.75;0.80)	(0.35;0.75;0.80)	(0.35;0.75;0.80)	(0.10;0.90;0.90)
P2	(0.35;0.75;0.80)	(0.35;0.75;0.80)	(0.50;0.5;0.50)	(0.35;0.75;0.80)	(0.35;0.75;0.80)
P3	(0.10;0.90;0.90)	(0.50;0.5;0.50)	(0.10;0.90;0.90)	(0.50;0.5;0.50)	(0.10;0.90;0.90)
P4	(0.10;0.90;0.90)	(0.10;0.90;0.90)	(0.10;0.90;0.90)	(0.35;0.75;0.80)	(0.10;0.90;0.90)
P5	(0.35;0.75;0.80)	(0.35;0.75;0.80)	(0.10;0.90;0.90)	(0.35;0.75;0.80)	(0.50;0.5;0.50)
			Personal decision level		
P1	(0.50;0.5;0.50)	(0.35;0.75;0.80	(0.50;0.5;0.50)	(0.50;0.5;0.50)	(0.50;0.5;0.50)
P2	(0.35;0.75;0.80)	(0.35;0.75;0.80)	(0.35;0.75;0.80)	(0.35;0.75;0.80)	(0.50;0.5;0.50)
P3	(0.50;0.5;0.50)	(0.35;0.75;0.80)	(0.50;0.5;0.50)	(0.50;0.5;0.50)	(0.35;0.75;0.80)
P4	(0.75;0.25;0.20)	(0.50;0.5;0.50)	(0.75;0.25;0.20)	(0.50;0.5;0.50)	(0.75;0.25;0.20)
P5	(0.35;0.75;0.80)	(0.35;0.75;0.80)	(0.50;0.5;0.50)	(0.50;0.5;0.50)	(0.35;0.75;0.80)

Table 7: Single value criteria matrix. Source: own elaboration.

	C1	C2	C3	C4	C5
P1	(0.5061;0.5221;0.5161)	(0.5061;0.5221;0.5161)	(0.5061;0.5221;0.5161)	(0.5061;0.5221;0.5161)	(0.5061;0.5221;0.5161)
P2	(0.2482;0.8137;0.8433)	(0.2482;0.8137;0.8433)	(0.2482;0.8137;0.8433)	(0.2482;0.8137;0.8433)	(0.2482;0.8137;0.8433)
P3	(0.1632;0.864;0.8766)	(0.1632;0.864;0.8766)	(0.1632;0.864;0.8766)	(0.1632;0.864;0.8766)	(0.1632;0.864;0.8766)
P4	(0.2625;0.805;0.8374)	(0.2625;0.805;0.8374)	(0.2625;0.805;0.8374)	(0.2625;0.805;0.8374)	(0.2625;0.805;0.8374)
P5	(0.5718;0.4282;0.4074)	(0.5718;0.4282;0.4074)	(0.5718;0.4282;0.4074)	(0.5718;0.4282;0.4074)	(0.5718;0.4282;0.4074)

The weights of the problems determined by the group of experts were determined consecutively and logically (see Table 8). In addition, the aggregate weighted decision matrix was calculated (see Table 9).

Table 8: Vector of weights of the criteria. Source: own elaboration.

	Criterion weight
C1	(0.6431;0.36581;0.3699)
C2	(0.68262;0.31738;0.30487)
C3	(0.56289;0.45317;0.44142)

	Criterion weight
C4	(0.38126;0.65378;0.67023)
C5	(0.55363;0.45751;0.46262)

Table 9: SVNS aggregate decision weighted matrix. Source: own elaboration.

	Criterion 1	Criterion 2	Criterion 3	Criterion 4	Criterion 5
P1	(0.28017;0.74074;0.73996)	(0.34547;0.67378;0.66363)	(0.28488;0.73867;0.7297)	(0.19296;0.83454;0.84042)	(0.32547;0.69692;0.69509)
P2	(0.09035;0.92622;0.93369)	(0.1114;0.90716;0.91422)	(0.09186;0.92563;0.93107)	(0.06222;0.95291;0.95931)	(0.10495;0.91375;0.92225)
P3	(0.13741;0.89893;0.911579)	(0.16943;0.87283;0.89107)	(0.13971;0.89813;0.91247)	(0.09463;0.9355;0.94833)	(0.15962;0.88185;0.90126)
P4	(0.14533;0.89421;0.91262)	(0.17919;0.86689;0.88697)	(0.14776;0.89337;0.90917)	(0.10008;0.93249;0.94638)	(0.16881;0.87633;0.89755)
P5	(0.31657;0.6898;0.68155)	(0.39032;0.60968;0.58807)	(0.32186;0.68732;0.66899)	(0.218;0.80203;0.80458)	(0.36772;0.63767;0.6266)

The results corresponding to the values of the coefficient of proximity are shown in Table 10, which served as the basis for determining the ranking of the effects in terms of difficulties in the development of emotional intelligence of the population range under study (see Table 11).

Table 10: Positive and negative ideal values and distances. Source: own elaboration.

	Ideal value +	Ideal value -
P1	(0.10495;0.91375;0.92225)	(0.10495;0.6374;0.6678)
P2	(0.1114;0.90716;0.91422)	(0.1114;0.6097;0.5881)
P3	(0.09186;0.92563;0.93107)	(0.0918;0.6873;0.669)
P4	(0.06222;0.95291;0.95931)	(0.06222;0.802;0.8046)
P5	(0.09035;0.92622;0.93369)	(0.31657;0.6898;0.6816)

Table 11: Ranking of components according to Proximity Coefficient (CP). Source: own elaboration.

Alternatives	d+	d-	CP	Order
C1	0.35506471	0.381339	0.51784	4
C2	0.15460157	0.602875	0.7959	1
C3	0.15049808	0.565311	0.78975	2
C4	0.15340259	0.559522	0.78483	3
C5	0.45245592	0.367267	0.44804	5

In the analysis of the results, it can be seen that the control of stressful situations is the main problem within EI in the Ecuadorian population. In this regard, the development of skills must be aimed at ensuring that people first achieve adequate control in certain stressful situations and based on this, the establishment of priorities and the adoption of strategies to control emotions and understand events. In these cases, the actions of trying to understand the situation and look for new alternative solutions satisfactorily help to achieve adequate management of feelings such as anxiety and depression, which will favor rapid recovery from negative moods and find new paths in the possible solutions to the problem.

Conclusion

Emotional intelligence as a subject of the greater number of studies in recent years and that somehow affects in a generalized way in the population of Ecuador, has a significant impact on the actions in the search for solutions to daily problems in any sphere of action. An important aspect is that the studies of Neutrosophic Science and its remarkable advances, allowed to assess the same and to determine the existing situation in the attention to each of its main components and the difficulties given in them. These were weighted using the NCM technique as there were indeterminations in some cases in the comparison of the same.

Neutrosophy made it possible to confirm more accurately that, despite the various investigations and the

treatment of the subject in recent years, there are still difficulties in the adequate development of the main skills and components within the personality of the Ecuadorian population. It is necessary to develop actions aimed at the attention and treatment of the subject, with emphasis on the current moments of greater influence of economic and social affectations.

The analysis of the results obtained by the benefit of the application of Neutrosophic Science allowed to determine that in emotional intelligence, the component of greater affectation is the control of stressful situations. This should lead to the correct establishment of priorities and the adoption of strategies to control emotions and understand events, which will help in the search for new ways to solve the problems faced and contribute to mental, personal, and social well-being.

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