Application of NCMs and MultiAlism in Indigenous Art Analysis

Allison J. García-Guano[1], Victoria S. Ruiz-Pinto[2], Bertha A. Paredes-Calderón[3], and Manuel E. Lanas López[4]

[1] Technical University of Cotopaxi, Cotopaxi. Ecuador. E-mail: allison.garcia9964@utc.edu.ec
[2] Technical University of Cotopaxi, Cotopaxi. Ecuador. E-mail: victoria.ruiz4946@utc.edu.ec
[3] Technical University of Cotopaxi, Cotopaxi. Ecuador. E-mail: bertha.paredes2530@utc.edu.ec
[4] Technical University of Cotopaxi, Cotopaxi. Ecuador. E-mail: manuel.lanas@utc.edu.ec

Abstract. This study utilizes Neutrosophic Cognitive Maps (NCMs) to investigate cultural interactions in Tigua, an indigenous village in Ecuador known for its rich artistic heritage. The approach evaluates five crucial factors: ancestral traditions (A), external influences (B), cultural synthesis (C), artistic creativity (D), and education and cultural transmission (E). The activation of cultural synthesis (node C) is crucial for merging traditions with new influences, leading to the development of cultural and artistic breakthroughs. By integrating MultiAlism notions into the discourse, the comprehension of Tigua artworks is heightened since it establishes a correlation between indigenous and postcolonial art. This synthesis not only alters and strengthens historic traditions but also improves educational programs and fosters the incorporation of external influences. The findings highlight the importance of education in protecting and promoting culture, highlighting that making changes to customs in a creative way is essential for maintaining cultural vitality in a global society. In the end, this strategy offers a distinct and comprehensive blueprint for other towns that want to protect their cultural heritage during a changing and developing environment.

Keywords: MultiAlism, art conservation, cultural adaptation, neutrosophic cognitive maps.

1 Introduction

The indigenous village of Tigua, situated in the rural parish of Zumbahua in the Pujilí canton of the Co-topaxi region, has successfully maintained its traditions and customs throughout the years. By engaging in this practice, it has preserved its cultural identity by means of creative manifestations as Tigua paintings [1]. These artworks, which integrate traditional methods with indigenous cultural motifs [2], exemplify a distinctive kind of Ecuadorian folk art that has been created from 1970 till now.

The Toaquiza family, led by Julio Toaquiza and his children, pioneered this pictorial style that has garnered the interest of historians and enthusiasts due to its abundant iconography and significant cultural, artistic, symbolic, and anthropological significance. Nevertheless, the production of these works has been shaped by three primary elements. Globalization, as facilitated by technology means, brings about new production practices and foreign cultural references, thereby impacting the traditional knowledge and comprehension of the Andean communities.

Immigration is the second aspect that results in the relocation of inhabitants, leading to the assimilation of foreign customs by modern generations. This assimilation causes a loss of identity in Andean cities [3]. Finally, the third component is education, which, despite its function in acquiring knowledge, frequently neglects to include cultural art in its curriculum.

These factors demonstrate how the art of Tigua has been conditioned over time. For the indigenous people of Tigua, maintaining ancestral techniques in their creative processes is crucial, as these techniques foster creativity and the inclusion of neighboring communities [4]. Added to this is the diversity of cultural art, which is seen as a significant resource for knowledge and dialogue. Furthermore, it helps to preserve the diversity of native art from any territory or locality, serving as a source of creative inspiration alongside innovation.

Therefore, this study aims to analyze and understand the interrelationships between different aspects of Tigua's culture, in order to identify strategies that promote the conservation and cultural innovation in a balanced manner. To this end, the following specific objectives are proposed:

- Analyze the cultural environment of Tigua through artistic expressions.

- Analyze the interrelationships between the components of indigenous art using the neutrosophic conceptual map.
- Propose strategies that enhance the culture and art of Tigua.

2 Materials and Methods

2.1 Qualitative Analysis of the Cultural Environment. Erwin Panofsky Method.

The study of Tigua paintings employs a qualitative methodology, specifically relying on Erwin Panofsky's method for iconographic analysis [5] [6]. The study commenced by conducting interviews with three prominent artists from the community, employing a standardized questionnaire to examine the diversity in the materials utilized in the production of their artworks. A total of 100 paintings were considered, but only thirty were chosen. The paintings that were not in the naive style or did not have Andean themes were excluded. The paintings were sourced from two primary galleries, namely the Primer Pintor Gallery and the Wilson Toaquiza Gallery, to ensure that the chosen artworks retained their ancestral attributes (Table 1).

Table 1: Coded record of the painting First Dream. Source: own elaboration.

Code	Theme: First dream	Processes	Materials
012		His initial sketches were made on pieces of paper, followed by placing the cured leather in a laurel wood frame and making undetailed pencil sketches. Subsequently, he painted from top to bottom using various types of brushes, giving detailed characteristics to the painting.	-Sheep leather -Wooden frame -Hair of their children -Aniline -Taino Plant -Petromax - Light

Dimension:	Unknown	**Technique**	Naive
Location:	Primer Pintor Gallery of Tigua	**Author**	Julio Toaquiza
Date	1973	**Cost:**	6200

By applying Erwin Panofsky's method, the cultural environment analysis of the Tigua paintings has facilitated a methodical and comprehensive examination, uncovering profound levels of significance and artistic skill. The analysis was organized into three levels: pre-iconographic, iconographic, and iconological, with each level providing a more profound comprehension of the visual aspects and their cultural and artistic importance.

At the pre-iconographic level, the paintings were analyzed to identify their pure forms and basic qualities. The compositions exhibit a diverse array of colors and textures that accurately depict the lives and natural surroundings of the Tigua population. The depictions of plant and animal life are particularly intricate, accurately portraying the variety of species and the interplay between humans and their surroundings.

Iconographic Level: This level entails the examination of traditional themes and narratives depicted in the artworks. Tigua paintings often depict ordinary occurrences within their society, combining elements of their traditional culture with their modern interactions. Recurring patterns were observed, including the use of geometric and organic shapes, which aid in structuring the compositions and guiding the viewer's comprehension towards the core concepts of unity and cultural continuity.

An in-depth analysis was conducted at the iconological level to interpret the intrinsic meanings of the works. This level showcased how Tigua artists effectively employed art to communicate fundamental aspects of their worldview, spirituality, and philosophy. Garments, tools, and creatures are displayed not merely for their practical or ornamental value, but also as symbols that have important cultural and spiritual meanings.

2.2 Neutrosophy

Definition 1. Let X be a universe of discourse[7]. A Neutrosophic Set (NS) is characterized by three membership functions[8], $u_A(x), r_A(x), v_A(x): X \rightarrow]^-0,1+[$, that satisfy the condition $-0 \leq \inf u_A(x) + \inf r_A(x) + \inf v_A(x) \sup u_A(x) + \sup r_A(x) + \sup v_A(x) \leq 3^+$ for all $x \in X$. $u_A(x), r_A(x)$ and $v_A(x)$ denote the true, indeterminate, and false membership functions of x in A, respectively, and their images are standard or non-standard subsets of $]-0,1+[$.

Neutrosophic Sets and Systems { Special Issue: Neutrosophy and Plithogeny: Fundamentals and Applications}, Vol. 69, 2024

3

Definition 2. Let X be a universe of discourse. A Single Value Neutrosophic Set (SVNS) A over X is an object of the form [9]:

$$A = \{\langle x, u_A(x), r_A(x), v_A(x)\rangle : x \in X\} \tag{1}$$

Where $u_A, r_A, v_A : X \to [0,1]$, satisfy condition $0 \le u_A(x), r_A(x), v_A(x) \le 3$ for all $x \in X$. $u_A(x), r_A(x)$ and $v_A(x)$ denote the true, indeterminate, and false membership functions of x in A, respectively. For convenience, a Single Valued Neutrosophic Number (SVNN) will be expressed as A = (a, b, c), where a, b, c [0,1] and satisfies $0 \le a + b + c \le 3$.

2.3 Neutrosophic Cognitive Maps (NCMs)

Starting from the previous elements, in this particular work the use of Neutrosophic Cognitive Maps (NCMs) is proposed considering the advantages that this technique offers compared to other soft-computing techniques [10], in terms of interpretability, scalability, aggregation of knowledge, dynamism and its ability to represent feed-back and indeterminacy relationships [11].

NCMs were introduced in 2003. NCMs are an integration of the Fuzzy Cognitive Maps (FCM) introduced by Kosko in 1986 and the Neutrosophic Sets (NSs) introduced by Smarandache in 1995. This technique overcomes the inability of traditional FCMs to represent indeterminacy. The inclusion of indeterminacy establishes that neutrality and ignorance are also forms of uncertainty. Exposes that FCMs constitute a technique that has received increasing attention due to its possibilities for representing causality. The following is a set of definitions necessary for working with NCMs. Firstly, let us formally expose the original definition of neutrosophic logic as it is shown in [12].

Definition 1 [13]: *Let* $N = ((T, I, F): T, I, F \in [0,1])$

Let C be a *neutrosophic set of evaluations*. v: *P*→N is a mapping of a group of propositional formulas into N, i.e., each sentence $p \in P$ is associated with a value in N, as it is exposed in Equation 2, meaning that p is T% true, I% indeterminate and F% false.

$$v(p) = (T, I, F) \tag{2}$$

Hence, neutrosophic logic is a generalization of fuzzy logic, based on the concept of neutrosophy.

Definition 2 [14]: Let K be a ring of real numbers. The ring generated by $K \cup I$ is called a *neutrosophic ring* if it involves the indeterminacy factor in it, where I satisfy $I2 = I, I + I = 2I$ and in general, $I + I + \ldots + I = nI, if\ k \in K, then\ k.I = kI, 0I = 0$. The neutrosophic ring is denoted by $K(I)$, which is generated by $K \cup I, i.e., K(I) = \langle K \cup I \rangle, where \langle K \cup I \rangle$ denotes the ring generated by K and I.

Definition 3: A *neutrosophic matrix* is a matrix $A = [a_{ij}]ij$ i =1, 2, …, m and j = 1, 2, …, n; $m, n \ge 1$, such that each $a_{ij} \in K(I)$, where K(I) is a neutrosophic ring.

Let us observe that an element of the matrix can have the form $a + bI$, where "a" and "b" are real numbers, whereas I is the indeterminacy factor. The usual operations of neutrosophic matrices can be extended from the classical matrix operations.

For example,

$$\begin{pmatrix} -1 & I & 5I \\ I & 4 & 7 \end{pmatrix} \begin{pmatrix} I & 9I & 6 \\ 0 & I & 0 \\ -4 & 7 & 5 \end{pmatrix} = \begin{pmatrix} -21I & 27I & -6 + 25I \\ -28 + I & 49 + 13I & 35 + 6I \end{pmatrix}$$

Additionally, a *neutrosophic graph* is a graph that has at least one indeterminate edge or one indeterminate node. The *neutrosophic adjacency matrix* is an extension of the adjacency matrix in classical graph theory. $a_{ij} = 0$ means nodes i and j are not connected, $a_{ij} = 1$ means that these nodes are connected and $a_{ij} = I$, which means the connection is indeterminate (unknown if there is a connection or not). Fuzzy set theory does not use such notions.

On the other hand, if indeterminacy is introduced in a cognitive map, then this cognitive map is called a *neutrosophic cognitive map*, which is especially useful in the representation of causal knowledge. It is formally defined in Definition 4.

Definition 4 [15,16]. A *Neutrosophic Cognitive Map* (NCM) is a neutrosophic directed graph with concepts like policies, and events, among others, as nodes and causalities or indeterminacies as edges. It represents the causal relationship between concepts.

In this case

The measures described below are used in the proposed model, they are based on the absolute values of the adjacency matrix [17]:

- Outdegree (v_i) is the sum of the row elements in the neutrosophic adjacency matrix. It reflects the strength of the outgoing relationships (c_{ij}) of the variable.

$$od(v_i) = \sum_{i=1}^{n} c_{ij} \tag{3}$$

- Indegree (v_i) is the sum of the column elements. It reflects the strength of relations (c_{ij}) outgoing from the variable.

$$id(v_i) = \sum_{i=1}^{n} c_{ji} \tag{4}$$

- Total centrality (total degree td (v_i)), is the sum of the indegree and the outdegree of the variable.

$$td(v_i) = od(v_i) + id(v_i) \tag{5}$$

The static analysis is applied using the adjacency matrix, taking into consideration the absolute value of the weights. Static analysis in Neutrosophic Cognitive Maps (NCMs), initially contains the neutrosophic number of the form $(a + bI$, where I = indetermination). It requires a process of deneutrosophication, where $I \in [0,1]$ and is replaced by their maximum and minimum values.

Finally, a sum of the values is calculated using (5), which is useful to obtain a single value. This value contributes to the identification of the characteristics to be attended, according to the factors obtained, for our case study.

$$\lambda([a_1, a_2]) = \frac{a_1 + a_2}{2} \tag{6}$$

$$A \succ B \Leftrightarrow \frac{a_1 + a_2}{2} > \frac{b_1 + b_2}{2} \tag{7}$$

In this paper nodes conections are representes with Single Valued Neutrosophic Number (SVNN) A deneutrosification process is used in this case in line with [18]

Let $AN = \{x, (TA(x), IA(x), FA(x)): x \in X\}$ be an NS. Its equivalent fuzzy membership set is defined as $AF = \{(x, \mu A(x)): x \in X\}$, where $\mu A(x) = s\left((TA(x), IA(x), FA(x)), (1,0,0)\right)$. So, using the equation of similarity:

$$\mu A(x) = 1 - \frac{1}{2}[(1 - T_A(x)) + \max\{I_A(x), F_A(x)\}] \tag{8}$$

As the range of the similarity measure function is the unit interval [0,1], μA(x)∈[0,1] for all x∈X. Hence, the membership function of the derived fuzzy set belongs to [0,1] and thus it satisfies the property of a membership function of a fuzzy set (FS).

The density function of the random variable X is defined as :

$$f(x) = \frac{\mu A(x)}{\Delta}\Delta$$

where $\Delta = \int_{-\infty}^{\infty} \mu A(x)\, dx$ $\tag{9}$

2.4 Philosophy and Art Integration via MultiAlism

MultiAlism proposes a paradigm that allows for the coexistence and interaction of other philosophical elements, including monism, dualism, pluralism, and more complex varieties. MultiAlism, created by Florentin Smarandache, promotes the investigation and combination of various dimensions. This makes it especially appropriate for environments that have a wide range of philosophical traditions, such as Latin America [19].

Leyva and Smarandache examine Latin American philosophy via the perspective of MultiAlism, which can be incorporated into indigenous art to provide a more profound and nuanced comprehension of the cultural and spiritual customs of the region. This study examines the incorporation of native philosophies and postcolonial modernist theories into the MultiAlism framework, emphasizing the possibility of dialogue and combination between these many traditions in Latin America.

Philosophical Aspects [18]:

- Monism posits the existence of a singular fundamental reality or principle, denoted as $< A > = \infty$, where $< A >$ represents an abstract concept or substance, and ∞ represents the entirety of the world, reality, or everything.

Neutrosophic Sets and Systems { Special Issue: Neutrosophy and Plithogeny: Fundamentals and Applications}, Vol. 69, 2024

5

- Dualism is a philosophical concept that acknowledges the existence of two fundamental and frequently opposing forces or principles. In this context, $<A>$ represents an abstract concept, a material substance, or any other entity, whereas $<antiA>$ represents its opposite or negation. The symbol ∞ represents the encompassing notion of the world, reality, or everything.

- Pluralism encompasses a multitude of coexisting principles or realities. In this context, $<pluriA>$ represents a quantity more than two (perhaps three) 'ideas', and ∞ symbolizes 'world', 'reality', or 'all'.

- .MultiAlism surpasses these classifications by promoting a framework in which these and other possible philosophical categories might dynamically interact, i.e., $<(multi)A> + <(multi)neutA> + <(multi)antiA> = \infty$.

- Pluralism, by going beyond these categorizations, encourages a framework in which different philosophical notions can interact in a dynamic manner. The equation $<(multi)A> + <(multi)neutA> + <(multi)antiA> = \infty$ represents this relationship.

MultiAlism offers a significant framework for comprehending and valuing the intricate interplay of diverse cultural, spiritual, and philosophical components found in Latin American indigenous art.

3 Results

3.1 Analysis of the cultural environment of Tigua

The study examines the progression of techniques and substances employed in Tigua paintings, emphasizing traditional customs and contemporary modifications. Since 1973, the paintings have consistently had a Naive style and have been executed on sheepskin canvases. Originally, aniline was utilized, but it did not adhere well to the sleek leather surface. Therefore, it was combined with the extract from the Tañe stem to obtain a successful blending of colors. Enamel blended with thinner, which created a satin finish, was discontinued because of its detrimental health effects, despite its cosmetic advantages. Therefore, acrylic and oil paints were ultimately selected in order to reduce the potential hazards to the respiratory system.

Interviews indicate that Julio Toaquiza initially painted on wooden drums, but later incorporated suggestions from visitor Olga Fisch, who recommended the use of wooden frames. Traditional painting materials, including chicken feathers and human hair, were utilized until 2007, at which point they were substituted with contemporary brushes.

The works explore themes such as religion, culture, traditions, and the daily lives of Tigua, showcasing a consistent thematic thread from its inception to the present day. At the pre-iconographic level, the paintings depict customary landscapes featuring mountains, volcanoes, and everyday tasks like spinning and herding. Iconographic analysis utilized Gestalt rules to deconstruct the visual arrangement, discerning the grouping of people, animals, and natural components to convey unity and resemblance (refer to Figures 1 to 4).
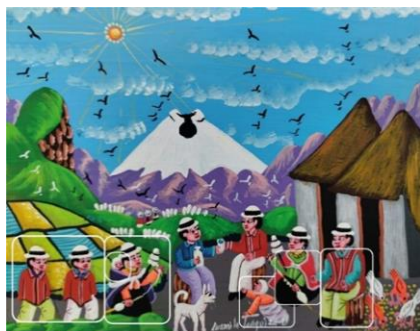

Figure 1: Iconographic analysis of human beings, clothing. Source: Taken from Wilson Toaquiza Gallery
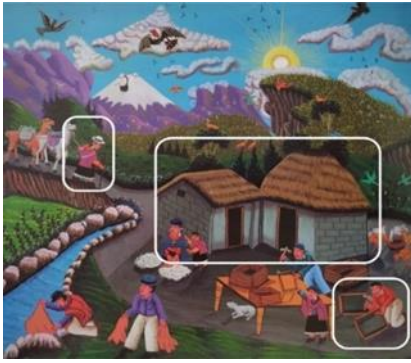
.

Figure 2: Iconographic analysis of animals, and elements of nature. Source: Taken from Wilson Toaquiza Gallery.

Figure 3: Iconographic analysis of infrastructure, and work tools. Source: Taken from Julio Toaquiza Gallery.
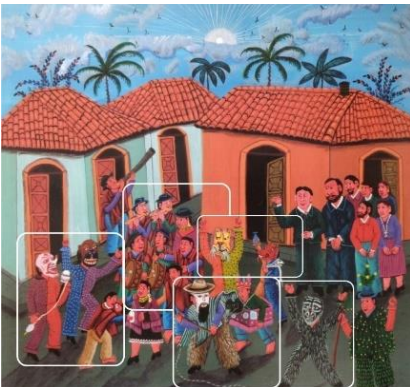

Figure 4: Iconographic analysis of festive characters. Source: Taken from Julio Toaquiza Gallery.

The study examines the symbolic depictions found in Tigua paintings, with a specific focus on animals, infrastructure, work instruments, and clothing. This piece of work emphasizes the correlation between nature, sustainability, and modernism, while also underscoring the significance of colors and patterns in communicating cultural meanings. The paintings function as a dynamic testament to the community.

3.2 NCMs for Indigenous Art

To enhance the culture of Tigua, it is necessary to visualize the relationships between the components of indigenous art through neutrosophic conceptual maps. This approach highlights the complexity and cultural dynamics inherent to their study and practice. It is essential to recognize that interactions between tradition and external influences are not binary and that indeterminacy in these interactions can lead to enriching and respectful forms of cultural expression. Consequently, the following neutrosophic conceptual map for indigenous art is presented:

1. Central Node: Indigenous Art
   - Description: This node acts as the core of the analysis, focused on how indigenous art serves as a dynamic manifestation of cultural identity and community creativity.
2. Neutrosophic Nodes and States:
   A. Ancestral Traditions

Neutrosophic Sets and Systems { Special Issue: Neutrosophy and Plithogeny: Fundamentals and
Applications}, Vol. 69, 2024

7

Neutrosophic State: They represent the essence and unalterable foundations of the community, but their interpretation and application can vary, showing how traditions adapt without losing their fundamental meaning.

B. External Influences

Neutrosophic State: While external influence may be seen as a dilution of cultural authenticity, it can also act as a catalyst for adaptation and change. It provides a new context for traditional expression without completely denying its value.

C. Cultural Synthesis

Neutrosophic State: This node highlights the emergence of cultural forms that are neither completely traditional nor entirely modern, but an amalgam that reflects both continuity and transformation.

D. Artistic Innovation.

Neutrosophic State: Focuses on how innovation within the indigenous artistic community creates new forms of art that may not clearly conform to traditional or modern categories but flow between both.

E. Education and Cultural Transmission.

Neutrosophic State: Education and cultural transmission in indigenous communities often face the challenge of balancing the preservation of ancestral knowledge with the incorporation of new ideas and techniques, which can result in practices that are both conservative and progressive.

3. Measurement Scales and Linguistic Terminology: Strong: from (1,0,0) to (0.8,0.2,0); moderate from (0.7,0.3,0) to (0.5,0.3,0.2); weak (0.3,0.4,0.3) to (0.2,0.6,0.2).

The analysis of the NCMs underscores the complexity and dynamics of the interactions between tradition and modernity in the context of indigenous art (see Tables 2 and 3). It accepts that the interaction between traditional and modern elements is not binary and recognizes that areas of indeterminacy and contradiction can be sources of cultural and artistic enrichment.

Table 2: NCM adjacency matrix.

Node	A	B	C	D	E
A	(1, 0, 0)	(0.2, 0.5, 0.3)	(0.8, 0.2, 0)	(0.7, 0.3, 0)	(0.9, 0.1, 0)
B	(0.3, 0.4, 0.3)	(1, 0, 0)	(0.5, 0.3, 0.2)	(0.6, 0.4, 0)	(0.2, 0.6, 0.2)
C	(0.7, 0.2, 0.1)	(0.6, 0.3, 0.1)	(1, 0, 0)	(0.9, 0.1, 0)	(0.8, 0.2, 0)
D	(0.5, 0.3, 0.2)	(0.7, 0.2, 0.1)	(0.8, 0.1, 0.1)	(1, 0, 0)	(0.7, 0.2, 0.1)
E	(0.9, 0.1, 0)	(0.3, 0.4, 0.3)	(0.8, 0.1, 0.1)	(0.7, 0.2, 0.1)	(1, 0, 0)

Table3: Deneutrosified adjacency matrix.

Node	A	B	C	D	E	$od(v_i)$
A	1	0.35	0.2	0.65	0.95	3.15
B	0.45	1	0.5	0.7	0.5	3.15
C	0.75	0.65	1	0.95	0.9	4.25
D	0.6	0.75	0.85	1	0.75	3.95
E	0.95	0.45	0.85	0.75	1	4
$id(v_i)$	3.75	3.2	3.4	4.05	4.1	

Table4: Centrality analysis

Nodes	$od(v_i)$	$id(v_i)$	$td(v_i)$
Ancestral traditions	3.15	3.75	6.90
External influences	3.15	3.2	6.35
Cultural synthesis	4.25	3.4	7.65
Artistic innovation	3.95	4.05	8.00
Education and cultural transmission	4	4.1	8.10

Therefore, the following order of importance of the nodes is defined: E≻D≻C≻B≻A. These results help us understand how the elements of art and indigenous culture intertwine to form a dynamic cultural ecosystem. The

nodes and their relationships, as well as the effect of activating the most influential node, are described below:
   I.   Node A (Ancestral Traditions)
         • Relationships: Connects bidirectionally with all other nodes (B, C, D, E).
         • Meaning: Represents the customs and practices transmitted that form the base of indigenous culture.
   II.   Node B (External Influences)
         • Relationships: Has a bidirectional connection with A and an indeterminate connection with C, representing the uncertainty about how external influences directly affect cultural synthesis.
         • Meaning: Symbolizes the external elements and forces that can influence or modify traditions.

   III. Node C (Cultural Synthesis)
         • Relationships: Connects bidirectionally with all nodes, highlighting its central role in integrating traditions and innovations.
         • Meaning: Embodies the fusion of ancestral traditions with modern or external influences, generating new cultural expressions.
   IV.   Node D (Artistic Innovation)
         • Relationships: Connects bidirectionally with A, C, and E, showing how innovation is fueled by education, cultural synthesis, and traditions.
         • Meaning: Represents the new forms of expression and creativity that arise within the culture.
   V.   Node E (Education and Cultural Transmission)
         • Relationships: Connects bidirectionally with all nodes except B, indicating that it plays a crucial role in teaching and preserving both traditions and innovations.
         • Meaning: Refers to how cultural practices are taught and kept alive through generations.

In this context, the strongest node is Node C (Cultural Synthesis), due to its central position and bidirectional connections with all nodes. If this node is activated, it implies a strong integration and adaptation of traditions and external influences, resulting in new cultural forms that may include artistic innovations and adapted educational methods. The activation of this node has a cascading effect on the others:
         • Increase in Artistic Innovation (D): The new cultural synthesis can inspire innovative artistic forms.
         • Reinforcement of Ancestral Traditions (A): Traditions adapt and become more resilient by being reinterpreted in new contexts.
         • Stimulation of Education and Cultural Transmission (E): Education incorporates these new cultural elements, ensuring transmission to future generations.
         • Interaction with External Influences (B): External influences are assimilated more effectively within the culture, allowing a dynamic interaction between the old and the new.

In summary, the activation of Node C facilitates a dynamic and healthy exchange among all aspects of the culture. It also allows for constant evolution and adaptation in the face of new influences and internal and external challenges.

4 Discussion

An analysis of Tigua paintings, employing Erwin Panofsky's methodology and iconographic documentation, uncovers a noteworthy artistic progression within the community. The study emphasizes the complexity of their visual arrangement and varied range of colors, showcasing the concepts of Gestalt. The iconological study examines the symbolism of the paintings, emphasizing the relationship between the society and its natural surroundings and indigenous wildlife, offering a significant record of their existence and encounters.

To maximize the potential of the findings described and promote the conservation and dissemination of the art and culture of Tigua, the following action plan is proposed, which includes specific strategies and activities (see Table 5). This plan is designed to strengthen artistic innovation, preserve ancestral traditions, and encourage education and cultural transmission.

Table 5: Action plan to promote the culture and art of Tigua. Source: own elaboration.

Strategy	Key activities	Indicators of success
Conservation of ancestral art.	- Cataloging and digitization of existing works.	- Number of digitized works.
	- Workshops on conservation techniques for local artists.	- Participation in workshops.
Artistic innovation and development.	- Creation of an art laboratory to experiment with new techniques and materials.	- New techniques developed.
	- Annual exhibitions to showcase innovative works.	- Assistance and sales at exhibitions.
Education and cultural	- Educational programs in schools that include the history	- Number of participating

Neutrosophic Sets and Systems { Special Issue: Neutrosophy and Plithogeny: Fundamentals and Applications}, Vol. 69, 2024

9

Strategy	Key activities	Indicators of success
transmission.	and art techniques of Tigua.	schools.
Integration of external influences.	- Scholarships for young artists to study both locally and internationally.	- Number of scholarships awarded.
	- Invitations to international artists for workshops and collaborations.	- Participating international artists.
	- Webinars and conferences on the global influence of traditional art.	- Attendance at online events.
Cultural synthesis.	- Collaborative projects that blend traditional and modern elements.	- Fulfilled projects.
	- Documentaries and publications that narrate the evolution of Tigua art.	- Viewings and distribution of documentaries.

The objective of this plan is to not only safeguard the cultural heritage of Tigua, but also to modify and rejuvenate it in response to contemporary difficulties and worldwide prospects. By doing so, it guarantees the continuous flourishing of Tigua's cultural diversity while also allowing it to flexibly change over time. Each strategy in the previous list is specifically meant to tackle various facets of cultural and artistic advancement in Tigua, encompassing the preservation of ancient techniques as well as the adaptation and creation of novel forms of artistic expression. It efficiently incorporates external influences and encourages education and cultural dissemination through inventive platforms and international collaborations. This systematic method guarantees that every component of cultural development is given thorough attention and sufficient resources, so aiding the accomplishment of the established goals.

By incorporating the ideas of MultiAlism [9] into the debate, the understanding of Tigua artworks is enhanced since it establishes a connection between indigenous art and postcolonial art. This approach places cultural diversity as a top priority and examines power structures, fostering a deeper comprehension and appreciation for the great indigenous heritage of Latin America [20]. The proposed action plan for preserving and promoting Tigua art involves MultAlism, which aims to conserve indigenous techniques while also advocating for creative and inclusive policies. These strategies are formulated to address current issues and guarantee the ongoing development and worldwide importance of Tigua's cultural heritage.

4 Conclusion

Neutrosophic Cognitive Maps (NCMs) have been successfully utilized to detect and analyze the intricate cultural dynamics of Tigua. Using NCMs, the evaluation of the connections among various cultural elements, such as traditional customs, creative advancements, and education, has facilitated the identification of specific focal points. Notably, node C (cultural synthesis) plays a crucial role in driving significant transformations in the cultural ecology. This technique has enabled the visualization and prediction of how actions in one area can impact others, so promoting more efficient strategic planning that considers the interconnection of cultural aspects.

Education and efficient cultural transmission are essential for the preservation and continuous advancement of Tigua's culture. By incorporating the art history, techniques, and cultural symbolism of Tigua, educational programs guarantee the preservation of ancestral knowledge for future generations. Furthermore, by cultivating a profound comprehension and admiration for indigenous art among young individuals, they not only sustain the culture but also promote the generation of novel artistic manifestations that preserve the tradition. This transmission is not one-way; it is enhanced by the integration of novel ideas and perspectives that young people can contribute, so assuring an ongoing evolution that honors the past while also focusing on the future.

6 References

[1] Pablo Alejandro, Q.-S.; Andrés, B.-S. Xavier; Marisol, P.; Patricio, A. P. Mauricio; Imbaquingo, N. Silvia. Indigenous Painting in Ecuador and Its Impact on Cultural Identity. Lecture Notes in Networks and Systems 2024, 773, 378-387.

[2] Corr, R. Shamans in the Colonial Frontier Zone: Spirit Mastery in Eighteenth-Century Coastal Ecuador. Ethnohistory 2023, 70, 45-64.

[3] Artzi, B.-a. Almost Like the Amazons. Latin American and Latinx Visual Culture 2022, 4, 54-74.

[4] Carey, D. J. Medicine and Health "in the Least Civilized Regions". The American Historical Review 2022, 127, 1715-1751.

[5] Gimenez, S. Dreaming Out Loud: Aphantasia and the Contingencies of Artistic Imagination. react/review: a responsive journal for art & architecture 2024, 4, 2-7.

[6] Karaiskou, V. Visual Literacy as a Tool to Explore What Lays Behind and Beyond Our Anticipations. Futures 2024, 158, 1-6.

[7]   González Caballero, E.; Leyva Vázquez, M.; Smarandache, F. On Neutrosophic Uninorms. Neutrosophic Sets and Systems 2021, 45, 340-348.

[8]   Voskoglou, M. G.; Smarandache, F.; Mohamed, M. q-Rung Neutrosophic Sets and Topological Spaces. Neutrosophic Systems With Applications 2024, 15, 58-66. https://doi.org/10.61356/j.nswa.2024.1515356.

[9]   Ramírez Guerra, D. M.; Gordo Gómez, Y. M.; Cevallos Torres, L. J.; Ortiz, F. G. P. Social Sports Competition Scoring System Design Using Single Value Neutrosophic Environment. Journal of International Journal of Neutrosophic Science 2022, 19, 389-402.

[10] Ricardo, J. E.; Flores, D. F. C.; Díaz, J. A. E.; Teruel, K. P. An Exploration of Wisdom of Crowds Using Neutrosophic Cognitive Maps. Neutrosophic Sets and Systems 2020, 37, 1.

[11] Hidalgo, M. V. A.; Vega, C. E. A.; Hernandez, C. E. P. Processing through Neutrosophic Cognitive Maps of the Risk Factors of Health Personnel in the Care of Patients with Covid-19. Neutrosophic Computing and Machine Learning 2022, 22.

[12] Raúl, M.; et al. Use of NeutroAlgebra for the Analysis of the Poor State of the Social Rehabilitation System in Babahoyo. Neutrosophic Sets and Systems 2022, 52, 166-170.

[13] Bathusha, S. S.; Raj, S. A. K. A Novel Approach on Energy of λJ-Dominating Single-Valued Neutrosophic Graph Structure. Neutrosophic Systems With Applications 2024, 16, 48-66. https://doi.org/10.61356/j.nswa.2024.16215.

[14] Kandasamy, W. B.; Smarandache, F. Neutrosophic Rings. arXiv preprint math/0607765, 2006.

[15] Mariscal Rosado, Z. M.; Maldonado Manzano, R. L.; González Alvarado, R. J. Impacto de la Deuda Externa en los Derechos de Babahoyo: Análisis con Mapas Cognitivos Neutrosóficos. Neutrosophic Computing and Machine Learning 2023, 27, 10-17.

[16] Kandasamy, I.; Arumugam, D.; Rathore, A.; Arun, A.; Jain, M.; W.B, V.; Smarandache, F. NCMPy: A Modelling Software for Neutrosophic Cognitive Maps Based on Python Package. Neutrosophic Systems With Applications 2023, 13, 1-22. https://doi.org/10.61356/j.nswa.2024.114.

[17] Berrezueta, R. A.; Aldaz, E. M.; López, B. C. E.; Aguirre, J. A. A. Neutrosophic Assessment of Personality Traits. Neutrosophic Sets and Systems 2023, 62, 17.

[18] Mandal, K. (2020). On Deneutrosophication. Neutrosophic Sets and Systems, 38, 409-423.

[19] Smarandache, F. The MultiAlist System of Thought. Neutrosophic Sets and Systems 2024, 61, 1. https://digitalrepository.unm.edu/nss_journal/vol61/iss1/31.

[20] Vázquez, M. L.; Smarandache, F. Integrating Contradictory Perspectives in Latin American Philosophy: A MultiAlism Approach. Neutrosophic Optimization and Intelligent Systems 2024, 3, 1-7. https://doi.org/10.61356/j.nois.2024.3226.