# A New Deneutrosophication Method Proposal for Use in Delphi Methods: Application in Ancestral Knowledge Analysis

**Edwin Fabián Cerda Andino[1,*], Gabriela Beatriz Arias Palma[1], Sanjar Mirzaliev[2]**

[1] Technical University of Cotopaxi, Ecuador

[2]Tashkent State University of Economics, Uzbekistan

Emails: edwin.cerda@utc.edu.ec, gabriela.arias@utc.edu.ec, s.mirzaliev@tsue.uz

**Abstract**

This study explores the rich cultural heritage of indigenous peoples and communities, whose traditions and adaptability have intrigued scholars interested in understanding their relevance in modern times. The Neutrosophic Delphi Method emerges as a vital tool in this research, offering a dynamic and versatile approach to address the inherent complexity of indigenous activities. By investigating the uncertainty and ambiguity in decision-making, this method enables a thorough examination of cultural practices. The interdisciplinary methodology employed focuses on the interaction between traditional and modern aspects, examining the main activities that define the daily lives of indigenous communities. The use of the Neutrosophic Delphi Method is highlighted for its ability to handle diverse perspectives and complex data, and the deneutrosophication process to improve precision and clarity in the findings. This technique ensures an accurate and harmonized representation of indigenous knowledge with modern scientific research. This effort seeks not only to enhance the academic legacy but also to foster international dialogue, promoting the recognition and appreciation of cultural diversity. By empowering indigenous populations to contribute to the generation of knowledge about their experiences, the study advocates for a more inclusive and equitable approach in scientific inquiry, acknowledging the invaluable contributions of indigenous communities to the cultural richness of our world.

**Keywords:** Deneutrosophication; Delphi methods; local media; traditional media; linguistic terms; Neutrosophic Delphi.

## 1. Introduction

Within the expansive realm of social study, there is a captivating avenue that leads to comprehending and valuing the customs that originate from indigenous peoples and communities across the globe. These communities, which have priceless cultural heritage, have been protectors of ancient wisdom that surpasses the boundaries of time and place for thousands of years. The intricate nature of its everyday operations, which are deeply rooted in tradition and adaptability, has piqued the curiosity of academics and intellectuals who are eager to unravel the principles behind its functioning and significance in modern times [1].

The Neutrosophic Delphi Method [2] is a valuable tool in qualitative research, providing a versatile and dynamic approach to tackle the inherent complexity of indigenous activities. This methodology, which is inspired by the principles of neutrosophic philosophy, aims to investigate the inherent uncertainty and ambiguity in decision-making. As a result, it enables a more comprehensive and thoughtful examination of the cultural practices within these societies [2].

This study explores the interaction between the traditional and modern aspects, focusing on a thorough assessment of the primary activities that define the everyday lives of indigenous peoples and communities [3]. By employing an interdisciplinary methodology, our objective is to comprehensively analyze and document these behaviors, delving into their geographical variations, cultural backgrounds, and the symbolic significance they hold within the social structure



DOI: https://doi.org/10.54216/IJNS.250129
Received: June 30, 2024 Revised: July 21, 2024 Accepted: August 30, 2024

of each group. This thorough analysis will enable us to comprehend the intricacy of the internal dynamics of these cultures, as well as their connection with the natural environment and the external influences that create their reality. Moreover, our objective is to investigate the application of the Neutrosophic Delphi Method as a cutting-edge research technique in this context. We will leverage its capacity to incorporate various viewpoints and effectively handle uncertainty methodically and rigorously. Therefore, we are confronted with a stimulating task: harmonizing the age-old knowledge of indigenous communities with the requirements of modern scientific research, through a productive exchange that holds the potential to reveal novel realms of knowledge and comprehension. In this pursuit, a Deneutrosophication Method is employed to enhance precision.

The primary objective of this study is to enhance the academic legacy and foster international conversation, so encouraging the recognition and admiration of cultural diversity in a world that is becoming more interconnected yet still divided. We acknowledge the significance of empowering indigenous populations to contribute to the generation of information regarding their own experiences, thereby fostering a more comprehensive and fair approach to scientific inquiry. Hence, our endeavor serves as a humble homage to the extensive heritage of sagacity and fortitude that defines indigenous communities, and as a plea to acknowledge and safeguard their priceless contribution to the cultural multiplicity of our world.

## 2. Related work

### 2.1. The main activities of indigenous peoples

Within the broad Andean interregional area, a dynamic array of activities takes place, intricately connected to the ancient heritage of indigenous populations. The daily life in this place combines tradition and modernity, as the activities of these communities represent their cultural identity, resistance, and adaptation. To comprehend the whole scope of their existence, it is imperative to delve further into both the concrete and intangible components of their being in this ever-changing context [4].

Agriculture is a pivotal endeavor that fundamentally shapes the lifestyle of these communities. It goes beyond basic survival, representing a conversation between humans and the land. Every seed sown and crop reaped embodies narratives and wisdom transmitted across successive generations, exemplifying a deep reverence for the natural cycle of existence. Similarly, the craftsmanship of indigenous peoples showcases their creativity and expertise via the use of traditional techniques and distinctive patterns. Every artwork, whether it be in the form of fabric or carvings, serves as a cultural representation that conveys worldviews, mythologies, and dreams [5].

The communities value traditional medicine as an invaluable treasure that has been kept for ages. The holistic approach of healers and shamans, which regards the individual as an integral part of an interrelated system, provides vital insights for contemporary society. Music and dance, via their mesmerizing rhythms and motions, embody the profound bond between the indigenous spirit and environment, as well as the ancient entities. These acts are not just ordinary daily tasks, but rather they are tangible expressions of a culturally diverse and rich heritage that is deeply connected to the land and spirituality. They ought to be explored and appreciated for their intricate and profound nature. In the actual work, research tools were used depending on the person from whom the information was collected. in some cases, a problem needs to be elaborated or explained because it is difficult to understand. the person in this situation. After applying the research tools, the results are aggregated by type of economic activity to analyze and discuss the results obtained. finally, analyze and comment on the results.

### 2.2. Neutrosophic Delphi Method

The Neutrosophic Delphi Method [7,8] is based on neutrosophic numbers, which are three-value vectors in the range [0, 1] used to indicate the degree of truth, indeterminacy, and falsehood of what is being measured. The difference with fuzzy Delphi techniques is in the explicit inclusion of indeterminacy, which enhances the precision of the outcome. In all cases, there is a group of experts who do not share opinions directly with each other but do so through a moderator. Experts are subjected to a questionnaire in multiple phases or rounds, which is refined in each round based on the level of consensus among participants.

**Definition 1** [9]. Let X be a discourse universe. A Neutrosophic Set (NS) is characterized by three membership functions, $u_A(x), r_A(x), v_A(x): X \rightarrow \,]^-0, 1^+[$ , which satisfies the condition $-0 \leq \inf u_A(x) + \inf r_A(x) + \inf v_A(x) \leq \sup u_A(x) + \sup r_A(x) + \sup v_A(x) \leq 3 +$ for every $x \in X$. The functions $u_A(x), r_A(x)$, and v_A (x) denote the membership functions of x in A for true, indeterminate, and false, respectively. Their images are either standard or non-standard subsets of $]^-0, 1^+[$. As stated in references [10, 11]. Let X be a universe of discourse. A Neutrosophic Single Valued Set (NSVS) is a mathematical concept. An object of the form A over X is: A is defined as the set of tuples $\langle x, u_A(x), r_A(x), v_A(x)\rangle$, where x belongs to the set X [10, 11].



DOI: https://doi.org/10.54216/IJNS.250129
Received: June 30, 2024 Revised: July 21, 2024 Accepted: August 30, 2024

**Definition 2[12].** Given $u_A, r_A, v_A: X \rightarrow [0,1]$, such that the condition $0 < u\_A(x) + r\_A(x) + v\_A(x) \leq 3$ holds for any $x \in X. u_A(x), r_A(x)$, and $v_A(x)$ represent the membership functions of x in A for true, indeterminate, and false, respectively. For convenience, a Single Valued Neutrosophic Set (SVNS) is expressed as $A = (a, b, c)$, where a, b, c belongs to the interval [0,1] and satisfies the condition $0 < a + b + c \leq 3$.

## 3. Material and Methods

The Delphi method is a structured communication technique that is developed as a systematic interactive predictive method, based on a panel of experts [13]. Their goal is to an agreement derived from the deliberation between specialists. This is an iterative procedure that works through a detailed questionnaire that is answered by the specialists. Once the information is received, the specialists must answer another questionnaire drawn up from the first one. Finally, the study presents the findings of the analysis of the collected data.

Delphi methodology utilizes expert judgments in the subject of study. The summary of the experts' trials (given in the form of evaluations and written comments) serves as feedback to the experts themselves as part of the questionnaire rounds. The Delphi technique should be based on solid concepts to yield conclusions that support the arguments.

Before initiating the use of the method, a series of preliminary tasks must be carried out, such as [14, 15]:

- Defining the context and time frame within which the prediction is made regarding the subject of study.
- Select the group of specialists and ensure their commitment to collaborate. The chosen persons must not only have a profound comprehension of the issue under investigation, but they must also have a range of viewpoints on the matter. The presence of multiple perspectives should hinder the development of any biases in the information provided on the panel.
- Provide a comprehensive explanation to experts about the nature of the method, to obtain a reliable prediction, since experts will be aware of the objectives of each process required in the methodology at all times.

The Delphi method is an information collection and processing technique that allows obtaining an assessment from a group of experts through consultation. This qualitative method is recommended when necessary to obtain expert, consensus, and representative opinions from a group of highly specialized people and to provide important background information for theoretical testing of proposed interventions [.

Owner of the medium. They were asked to complete a cognitive test and all invited experts graciously agreed. This method is used to evaluate the following cognitive factors according to their competence in the counseling topic:

IC: the level of relevant information and knowledge available to subject matter experts.

IA: Expert argumentation coefficient based on a critical analysis of the topic.

I: Determine the qualification coefficient of the expert consulted, Use the formula according to the DELPHI method, where

$$I = 0.5\ (Kc + Ka) \quad (1)$$

A deneutrosification process is used in this case in line with [16]

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 proposed on,

$$\mu A(x) = 1 - \frac{1}{2}[(1 - T_A(x)) + \max\{I_A(x), F_A(x)\}] \quad (3)$$

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

(4)



DOI: https://doi.org/10.54216/IJNS.250129
Received: June 30, 2024 Revised: July 21, 2024 Accepted: August 30, 2024

## 4. Case study

After determining the content of the information (IC) and the level of argumentation of each expert on the research topic, their skills are determined, which leads to the following results. Characteristics are rated using the following linguistic scale (Table 1). These notes are saved for inclusion in the database.

**Table 1:** Linguistic terms used.

| Linguistic term | SVN number |
|---|---|
| Extremely high (EH) | (1, 0, 0) |
| Very very high (VVH) | (0.9, 0.1, 0.1) |
| Very high (VH) | (0.8,0.15,0.20) |
| High (H) | (0.70,0.25,0.30) |
| Medium-high (MH) | (0.60,0.35,0.40) |
| Medium(M) | (0.50,0.50,0.50) |
| Medium-Low (ML) | (0.40,0.65,0.60) |
| Low (L) | (0.30,0.75,0.70) |
| Very low (VL) | (0.20,0.85,0.80) |
| Very very low (VVL) | (0.10, 0.90, 0.90) |
| Extremely low (EL) | (0,1,1) |

**Table 2:** Results of the expert selection process.

| Experts | Kc. | Ka. | K. | **Category** |
|---|---|---|---|---|
| 1 | (0.50,0.45,0.40) | (0.50,0.50,0.50) | (0.55,0.50,0.50) | Medium(M) |
| 2 | (1, 0, 0) | (0.7,0.15,0.20) | (0.9, 0.1, 0.1) | Very very high (VVH) |
| 3 | (0.9, 0.1, 0.1) | (1, 0, 0) | (0.95, 0.1, 0.1) | Very very high (VVH) |
| 4 | (0.7,0.15,0.20) | (0.9, 0.1, 0.1) | (0.75,0.15,0.20) | Very high (VH) |
| 5 | (1, 0, 0) | (0.9, 0.1, 0.1) | (0.95, 0.1, 0.1) | Extremely high (EH) |
| 6 | (0.7,0.15,0.20) | (0.9, 0.1, 0.1) | (0.75,0.15,0.20) | Very high (VH) |
| 7 | (0.70,0.25,0.30) | (0.9, 0.1, 0.1) | (0.7,0.15,0.20) | Very high (VH) |
| 8 | (0.7,0.15,0.20) | (0.9, 0.1, 0.1) | (0.75,0.15,0.20) | Very high (VH) |
| 9 | (0.50,0.45,0.40) | (0.50,0.50,0.50) | (0.55,0.50,0.50) | Medium-Low (ML) |
| 10 | (1, 0, 0) | (0.9, 0.1, 0.1) | (0.95, 0.1, 0.1) | Extremely high (EH) |
| 11 | (0.50,0.45,0.40) | (0.50,0.50,0.50) | (0.550, 0.50, 0.50) | Medium-Low (ML) |
| 12 | (0.9, 0.1, 0.1) | (0.7,0.15,0.20) | (0.75,0.15,0.20) | Very very high (MMB) |
| 13 | (1, 0, 0) | (0.9, 0.1, 0.1) | (0.95, 0.1, 0.1) | Extremely high (EH) |
| 14 | (0.7,0.15,0.20) | (1, 0, 0) | (0.9, 0.1, 0.1) | Very high (MB) |
| 15 | (0.50,0.45,0.40) | (0.50,0.50,0.50) | (0.55,0.50,0.50) | Medium-Low (MDM) |
| **Total** | | | **12.91/15=0.860** | |



DOI: https://doi.org/10.54216/IJNS.250129
Received: June 30, 2024 Revised: July 21, 2024 Accepted: August 30, 2024

The topic presented is a set of data that appears to represent expert evaluations or ratings in different categories. Each category appears to have three dimensions of evaluation, represented by three numbers in parentheses. These dimensions could be related to some type of specific skill, competency, or metric that experts are evaluating. Additionally, each category is assigned a category rating, which appears to be a designation based on averages of expert evaluations. When analyzing these data, significant variability is observed in the experts' evaluations for each category. Some categories show consistently high scores on all dimensions, suggesting a high level of competence or performance in that areas. On the other hand, there are categories where the scores are more dispersed, which could indicate a lack of consensus among experts or greater variability in the skills evaluated.

The overall category rating, calculated as the average of the expert evaluations, indicates that the overall level of competence or performance in all categories is high. However, it is important to note that this rating is a simplification of the complexity of the underlying data and may not fully capture the variability and diversity of skills and competencies assessed by the experts. In conclusion, these data provide an intriguing snapshot of expert evaluations in different categories, which can be useful in understanding and evaluating performance in various areas of interest. However, more detailed and contextualized analysis is required to fully interpret the complexity and variability of expert evaluations and their relationship to assigned category rating.

**Table 3:** Results of coding the experts' competence scores regarding Competence Coefficient (K)

| From | Until | Competence |
|---|---|---|
| 0.8 < | ≤ 1.0 | High |
| 0.5 < | ≤0.8 | Medium |
| | ≤ 0.5 | Low |

Consequently, it was decided to choose 11 experts with both high and medium scores. these selected experts reviewed the main activities carried out by indigenous communities. to carry out this review, five inclusion criteria were established for the proposals, which were carefully reviewed and evaluated by the experts.

The evaluation of the main activities developed by indigenous communities involves the consideration of several fundamental criteria that reflect their viability and long-term growth potential in a constantly changing context. among the most important activities are:

1. Sustainable Agriculture: Agriculture is a fundamental activity for many indigenous communities, who practice traditional agricultural methods that are in harmony with the environment and promote the conservation of land and natural resources.
2. Crafts and production of traditional items: Indigenous communities are known for their skill in the production of traditional crafts and items, such as weaving, pottery, basketry, wood carving, and jewelry, which reflect their cultural identity and ancestral knowledge.
3. Sustainable fishing and hunting: Many indigenous communities depend on fishing and hunting as important sources of food and livelihood. However, these activities are carried out in a sustainable manner, respecting breeding seasons and aquatic and terrestrial ecosystems.
4. Traditional medicine: Indigenous communities have vast knowledge of medicinal plants and traditional healing techniques, which have been transmitted from generation to generation. Traditional medicine plays a vital role in the health and well-being of these communities.
5. Biodiversity conservation: Indigenous communities are guardians of vast areas of biodiversity, such as forests, jungles, and marine areas, and play a crucial role in their conservation and sustainable management. Their traditional knowledge about the environment is invaluable for the protection of biological diversity and the mitigation of climate change.

Here are the five criteria used to evaluate these activities in their order of importance:

1. Environmental sustainability: This criterion evaluates the extent to which the activities of indigenous communities are aligned with practices that promote the conservation of the environment and biodiversity. The management of natural resources, the use of traditional technologies that respect the environment and the adoption of agricultural and subsistence practices that do not deplete natural resources are considered.



DOI: https://doi.org/10.54216/IJNS.250129
Received: June 30, 2024 Revised: July 21, 2024 Accepted: August 30, 2024

2. Cultural resilience: This criterion examines how the activities of indigenous communities contribute to the preservation and promotion of their cultural identity, traditions, language, and ancestral knowledge. The intergenerational transmission of knowledge, participation in traditional ceremonies and rituals, as well as the culture's ability to adapt to external changes are evaluated.

3. Socioeconomic impacts: This criterion analyzes the effect of indigenous activities on the well-being and prosperity of communities, considering aspects such as income generation, access to basic services such as education and health, gender equity and social cohesion. within the community.

4. Autonomy and self-government: This criterion evaluates the degree of autonomy and self-determination that indigenous communities have in making decisions about their activities and resources. The capacity of communities to manage their own internal affairs, exercise their territorial rights and participate in consultation and dialogue processes with external entities is considered.

5. Conservation of cultural and natural heritage: This criterion examines the actions undertaken by indigenous communities to protect and conserve their tangible and intangible cultural heritage, as well as ecosystems and areas of cultural and spiritual importance to their people. The management of sacred sites, the preservation of traditional craft and artistic practices, and the promotion of sustainable cultural tourism are evaluated.

Below we describe the results of processing the responses to an expert consultation on the evaluation of the universal rights of citizens, evaluated by objective judges.

**Table 4:** Results by absolute frequency.

| ITEMS | *C1 VERY SUITABLE* | *C2 FAIRLY SUITABLE* | *C3 SUITABLE* | *C4 LIMITED SUITABILITY* | *C5 NOT SUITABLE* | TOTAL |
|---|---|---|---|---|---|---|
| **1** | 8 | 3 | 0 | 0 | 0 | 11 |
| **2** | 8 | 3 | 0 | 0 | 0 | 11 |
| **3** | 6 | 5 | 0 | 0 | 0 | 11 |
| **4** | 6 | 3 | 2 | 0 | 0 | 11 |
| **5** | 6 | 4 | 1 | 0 | 0 | 11 |

Table 4 presents the results obtained through the absolute frequency in relation to different elements evaluated, denoted as C1, C2, C3, C4 and C5. These elements represent various evaluation criteria that have been applied to determine the degree of adequacy of certain aspects or conditions under study. When analyzing the data presented in the table, a variety of scores assigned to each element is observed, thus reflecting the diversity of opinions and perceptions of the evaluators. For example, in element 1, it can be seen that the majority of evaluators have given ratings of "Very Suitable" and "Quite Suitable", with a total absence of ratings of "Limited Suitability" or "Not Suitable". This suggests a general positive perception regarding the adequacy of said element according to the established criteria. On the other hand, in element 4, a more varied distribution of ratings is observed, with some evaluations of "Not Adequate" and "Not Suitable", which could indicate areas for improvement or problematic aspects that require attention.

It is important to highlight that the interpretation of these results must be carried out considering the specific context in which the evaluation criteria were applied. certain items may be more susceptible to certain biases or subjective interpretations by raters. Furthermore, it is crucial to take into account the validity and reliability of the criteria used to ensure objectivity and consistency in the evaluation. In this sense, Table 4 provides an overview of the distribution of the scores obtained concerning the different elements evaluated. However, for a more complete and precise understanding of the results, a more detailed analysis would be necessary that considers other relevant factors, such as the specific context of the evaluation, the characteristics of the evaluators and the conditions under which the criteria were applied. of evaluation.

Table 5 shows the expert assessment of the criteria of elements related to the sustainability models of indigenous and non-indigenous digital media that ensure the effective implementation of sustainability in Ecuador.



DOI: https://doi.org/10.54216/IJNS.250129
Received: June 30, 2024 Revised: July 21, 2024 Accepted: August 30, 2024

**Table 5:** Results of the evaluation process of the professional criteria for the validation factors.

| Items | Value |
|---|---|
| **1** | (0.8, 0.1, 0.1) |
| **2** | (0.8, 0.1, 0.1) |
| **3** | (0.6,0.15,0.20) |
| **4** | (0.60,0.55,0.60) |
| **5** | (0.60,0.25,0.30) |

To calculate crisp value equations 2 and equation 3 are used:

For each element:

1. $\mu A(x_1) = 0.85$
2. $\mu A(x_1) = 0.85$
3. $\mu A(x_1) = 0.7$
4. $\mu A(x_1) = 0.5$
5. $\mu A(x_1) = 0.65$

Therefore, the final crisp values are:

**Table 6:** Results of the evaluation process of the activities by the experts.

| Criteria to evaluate | Crips values |
|---|---|
| **Sustainable agriculture** | 0.2394 |
| **Crafts and production of traditional items** | 0.2394 |
| **Sustainable fishing and hunting** | 0.1972 |
| **Traditional medicine** | 0.1408 |
| **Biodiversity conservation** | 0.1831 |

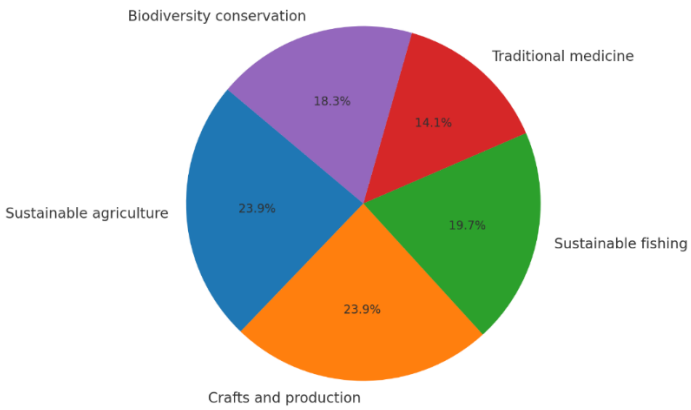


**Figure 1:** Results of the process of evaluation of the activities by the experts.

The pie chart depicts the normalized distribution of criteria utilized to assess crisp values. Each segment indicates the ratio of several evaluation criteria to the overall set:



DOI: https://doi.org/10.54216/IJNS.250129
Received: June 30, 2024 Revised: July 21, 2024 Accepted: August 30, 2024

The sectors of sustainable agriculture and crafts and the manufacture of traditional items each make up 23.94% of the total contribution. This signifies that these factors hold equal significance or contribute equally to the evaluation set. The proportion of sustainable fishing and hunting amounts to 19.72% of the total, which is a little lower than the previously specified requirements.

The significance of traditional medicine is considerably lesser, accounting for 14.08% in comparison to other categories. Biodiversity conservation accounts for 18.31% of the examined criteria, representing a moderate share.

The pie chart visually displays the distribution of several evaluation criteria based on their relative relevance, providing a straightforward and easily comprehensible overview of the normalized data.

## 5. Conclusion

Exploring the practices of Indigenous peoples and communities worldwide in the field of social studies uncovers a fascinating and complex cultural history. These communities, which safeguard ageless knowledge that surpasses temporal and spatial boundaries, exhibit a daily existence firmly grounded in both tradition and flexibility. This has sparked the interest of scholars who are eager to understand the principles and relevance of their functioning in contemporary times. The Neutrosophic Delphi Method is an invaluable instrument in qualitative research that offers a versatile and dynamic way to effectively tackle the inherent complexity of indigenous activities. Building upon the principles of neutrosophic philosophy, this approach explores the intrinsic uncertainty and ambiguity involved in decision-making, facilitating a thorough and deliberate analysis of cultural practices within these societies.

This study examines the interaction between traditional and modern elements, with a specific emphasis on doing a comprehensive evaluation of the main activities that shape the daily lives of indigenous peoples and communities. The aim is to examine and record these actions using an interdisciplinary approach, exploring their regional differences, cultural origins, and symbolic importance. Moreover, the study underscores the utilization of the Neutrosophic Delphi Method, emphasizing the significance of deneutrosification to augment accuracy and lucidity. This technique guarantees the appropriate representation of the diverse perspectives of indigenous knowledge, effectively blending ancient wisdom with contemporary scientific study. This initiative aims to enrich the intellectual heritage and facilitate global dialogue, fostering the acknowledgment and admiration of cultural variety. This highlights the importance of empowering indigenous populations to participate in the creation of knowledge about their experiences, promoting a more inclusive and equitable approach to scientific research, and recognizing their invaluable contribution to the cultural diversity of our world.

**Funding:** "This study did not receive external funding."

**Conflict of interest:** “The authors declare that they have no conflict of interest.”

## References

[1] Vázquez, M. L., & Smarandache, F. (2024). Integrating Contradictory Perspectives in Latin American Philosophy: A MultiAlism Approach. Neutrosophic Optimization and Intelligent Systems, 3, 1-7.
[2] Joselyne, I. Marina, C. P., P. Cagin, T. (2024). Fusion of Expert Judgment using the Neutrosophic Delphi Method to Evaluate Tax Behavior. Journal of International Journal of Neutrosophic Science, 23( 4), 302-307.
[3] Vafadarnikjoo, A., Mishra, N., Govindan, K., & Chalvatzis, K. (2018). Assessment of consumers' motivations to purchase a remanufactured product by applying Fuzzy Delphi method and single valued neutrosophic sets. Journal of cleaner production, 196, 230-244.
[4] Peña, G. D. L. (2005). Social and cultural policies toward indigenous peoples: Perspectives from Latin America. Annu. Rev. Anthropol., 34(1), 717-739.
[5] Che, C. T., George, V., Ijinu, T. P., Pushpangadan, P., & Andrae-Marobela, K. (2024). Traditional medicine. In Pharmacognosy (pp. 11-28). Academic Press.
[6] Wernke, S., VanValkenburgh, P., & Saito, A. (2020). Interregional archaeology in the age of big data: building online collaborative platforms for virtual survey in the Andes. Journal of Field Archaeology, 45(sup1), S61-S74.
[7] Joselyne, I. Marina, C. P., P. Cagin, T. (2024). Fusion of Expert Judgment using the Neutrosophic Delphi Method to Evaluate Tax Behavior. Journal of International Journal of Neutrosophic Science, 23( 4), 302-307.
[8] Elisabeth, Nery. , I., Anderson. , E., Isaac. , N., Mirian. , Kümmel, Christian. Neutrosophic Delphi method to analyze the impact of Internships on the comprehensive development of university students. Journal of International Journal of Neutrosophic Science, vol. 24, no. 4, 2024, pp. 223-232.



DOI: https://doi.org/10.54216/IJNS.250129
Received: June 30, 2024 Revised: July 21, 2024 Accepted: August 30, 2024

[9] Voskoglou, M. G., Smarandache, F., & Mohamed, M. (2024). q-Rung Neutrosophic Sets and Topological Spaces. Neutrosophic Systems With Applications, 15, 58-66.
[10] F., M. Marrero, S. (2024). Climate Optimization in Greenhouses Using the NARMA-L2 Model: An Advanced Integration of Environmental Variables. Journal of Fusion: Practice and Applications, 16( 1), 253-263.
[11] Md, Z. A., N. A., N. Hakimi, M. Ahmad, G. Al-Sharqi, F. Al-Quran, A. M., A. (2024). A DEMATEL Analysis of the Complex Barriers Hindering Digitalization Technology Adoption in the Malaysia Agriculture Sector. Journal of Journal of Intelligent Systems and Internet of Things, 13( 1), 21-30.
[12] González-Caballero, E., Leyva-Vázque, M., & Smarandache, F. (2021). On neutrosophic uninorms. Neutrosophic sets and systems, 45(1), 22.
[13] Ghag, N., Acharya, P., & Khanapuri, V. (2023). Analyzing the sustainable international competitiveness factors of SMEs by Fuzzy Delphi and Neutrosophic DEMATEL. Business Strategy & Development, 6(3), 447-463.
[14] Nowack, M., Endrikat, J., & Guenther, E. (2011). Review of Delphi-based scenario studies: Quality and design considerations. Technological Forecasting and Social Change, 78(9), 1603-1615.
[15] Phani, S. Sandeep, K. Raghavendra, N. Sharma, A. Pandey, J. Chouhan, V. (2024). Outlier Management and its Impact on Diabetes Prediction: A Voting Ensemble Study. Journal of Journal of Intelligent Systems and Internet of Things, 12( 1), 08-19.
[16] Mandal, K. (2020). On Deneutrosophication. Neutrosophic Sets and Systems, 38, 409-423.



DOI: https://doi.org/10.54216/IJNS.250129
Received: June 30, 2024 Revised: July 21, 2024 Accepted: August 30, 2024