

12-1-2022

## Neutrosophic IADOV in the Analysis of Child Labor and its Causes

Raúl Fabricio Sánchez Santacruz

*Universidad Regional Autónoma de Los Andes*, [ub.raulsanchez@uniandes.edu.ec](mailto:ub.raulsanchez@uniandes.edu.ec)

Mesías Elías Machado Maliza

*Universidad Regional Autónoma de Los Andes*, [ur.mesiasmachado@uniandes.edu.ec](mailto:ur.mesiasmachado@uniandes.edu.ec)

Cristina Mercedes Rosero Morán

*Universidad Regional Autónoma de Los Andes*, [ut.cristinarm00@uniandes.edu.ec](mailto:ut.cristinarm00@uniandes.edu.ec)

Andrea Katherine Bucaram Caicedo

*Universidad Regional Autónoma de Los Andes*, [ua.andreabucaram@uniandes.edu.ec](mailto:ua.andreabucaram@uniandes.edu.ec)

Follow this and additional works at: [https://digitalrepository.unm.edu/nss\\_journal](https://digitalrepository.unm.edu/nss_journal)

---

### Recommended Citation

Santacruz, Raúl Fabricio Sánchez; Mesías Elías Machado Maliza; Cristina Mercedes Rosero Morán; and Andrea Katherine Bucaram Caicedo. "Neutrosophic IADOV in the Analysis of Child Labor and its Causes." *Neutrosophic Sets and Systems* 52, 1 (2022). [https://digitalrepository.unm.edu/nss\\_journal/vol52/iss1/10](https://digitalrepository.unm.edu/nss_journal/vol52/iss1/10)

This Article is brought to you for free and open access by UNM Digital Repository. It has been accepted for inclusion in *Neutrosophic Sets and Systems* by an authorized editor of UNM Digital Repository. For more information, please contact [disc@unm.edu](mailto:disc@unm.edu).



# Neutrosophic IADOV in the Analysis of Child Labor and its Causes

**Raúl Fabricio Sánchez Santacruz<sup>1</sup>, Mesías Elías Machado Maliza<sup>2</sup>, Cristina Mercedes Rosero Morán<sup>3</sup>, and Andrea Katherine Bucaram Caicedo<sup>4</sup>**

<sup>1</sup> Universidad Regional Autónoma de Los Andes, Sede Babahoyo. Ecuador. E-mail: [ub.raulsanchez@uniandes.edu.ec](mailto:ub.raulsanchez@uniandes.edu.ec)

<sup>2</sup> Universidad Regional Autónoma de Los Andes, Sede Riobamba. Ecuador. E-mail: [ur.mesiasmachado@uniandes.edu.ec](mailto:ur.mesiasmachado@uniandes.edu.ec)

<sup>3</sup> Universidad Regional Autónoma de Los Andes, Sede Tulcán. Ecuador. E-mail: [ut.cristinarm00@uniandes.edu.ec](mailto:ut.cristinarm00@uniandes.edu.ec)

<sup>4</sup> Universidad Regional Autónoma de Los Andes, Matriz Ambato. Ecuador. E-mail: [ua.andreabucaram@uniandes.edu.ec](mailto:ua.andreabucaram@uniandes.edu.ec)

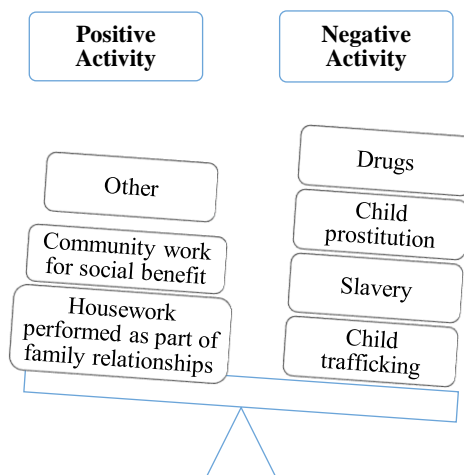
**Abstract.** In Ecuador, there is a systematic regulatory legal framework that contemplates child labor in correspondence with the provisions of international organizations, institutions, treaties, and conventions. A work that is prohibited if its nature or the conditions in which it is carried out, is likely to harm the physical and mental development, health, safety, and morality of minors. The objective of this work is to analyze child labor and its causes. This kind of work is exercised by girls, boys, and adolescents and it hinders, among other things, access to education for those minors. To investigate the causes that provoke it, it is decided to use the Iadov neutrosophic method, to analyze the consensus and acceptance of the experts. It is concluded that poverty is the main cause of child labor. So, the ability of the poorest families to protect their children should be supported.

**Keywords:** child labor, poverty, Iadov, Neutrosophy.

## 1 Introduction

The number of boys, girls, and adolescents who are dedicated to work and are exploited economically is significant. It is very common to see children who carry out the most varied tasks in public places, even in the surrounding area of government institutions, which reveals that in practice the provisions and regulations are systematically violated [1]. The International Labor Organization defines child labor as all work that deprives children of their childhood, their potential, and their dignity, and that is detrimental to their physical and psychological development.

This definition identifies as child labor any activity that deprives the boy or girl of the enjoyment of the rights of that age, such as education, health, and recreational activities that are so important for the psychosocial development of the individual and that damage their physical, mental and/or moral, well-being, as stipulated in article 48 of the Code for Children and Adolescents when expressing the obligation of the State to assume this care [1]. Child labor can be understood as all those activities that generate risk and systematic vulnerability of human rights and limit the comprehensive development of children and adolescents who are exploited. Although not all its forms are harmful to the lives of minors. If the work does not harm their health, or their physical and mental development, and does not interfere with their school activities, it is a positive activity that contributes to the comprehensive education of children and adolescents (Figure 1).



**Figure 1:** Child labor. Source: own elaboration

The legal and technical criterion is that child labor is that which is carried out by a minor under 18 years of age. It is aimed at obtaining economic returns, through the offer of a good or service, whether paid or not, performed temporarily or permanently, both in the family environment, as well as for third parties, with a contractual relationship or in a precarious manner and can be legal or illegal:

- Special protection against any type of labor or economic exploitation.
- The work of minors under the age of fifteen is prohibited, and
- Policies for the progressive eradication of child labor should be implemented.
- The work of adolescent girls and adolescents will be exceptional, and
- It may not violate the right to education or be performed in situations that are harmful or dangerous to health or personal development.

The concept of child labor differs from adolescent work. In this sense, the United Nations Children's Fund recognizes child labor as "all work activity, paid or not, carried out by boys and girls under 15 years of age that hinders their educational process or affects their health and integral development. Meanwhile, adolescent work is when this activity is carried out by people over 15 and under 18 years of age. In Ecuador, child labor is defined as "any paid or unpaid activity carried out by boys, girls and adolescents below the general minimum age for admission to employment in the production, marketing, processing, sale or distribution of goods or services; or that carried out by adolescents in conditions of violation of the norms that regulate the work of adolescents". For UNICEF, child labor refers to the population between 5 and 14 years old that is involved in work activities. More specifically, a boy or girl is considered to be in child labor under the following classification [2]:

- 1) boys and girls between 5 and 11 years old who worked at least one hour a week in some economic activity or at least 28 hours a week in domestic work; and
- 2) boys and girls between 12 and 14 years old who work at least 14 hours a week in paid activities, or at least 28 hours a week in domestic activities.

Although there is extensive literature on the consequences of child labor on immediate child well-being, there has not been enough debate, outside of academic circles, on the medium-term effects that child labor has on labor markets, poverty, well-being, and economic development, as well as in the future development of children and, therefore, in the intergenerational reproduction of poverty. The consequence of this is that the debate and the policies tend to focus on finding mechanisms for compliance with current regulations, which is related to locating the problem in the workplace and family. Child labor is located, from this point of view, in the field of capabilities. Work disables or limits, on the one hand, the achievement of freedoms that occur through learning and experiences.

The phenomenon of child labor has multiple causes, including social, cultural, economic, historical, and political factors. It argues that to achieve the eradication of this social problem, the Ecuadorian State and government must fight the scourge of poverty and guarantee parents a decent job that allows them to meet the needs of the home, with which they will not have to allow and in many cases demand economic cooperation from their offspring through work. Another cause of this problem is associated with social, cultural, and economic inequalities, which uniquely affect the civil rights of children and adolescents.

For reasons of gender, girls are marginalized both in their present and in their future. A girl marginalized from her origins and without education has a high probability of becoming the mother of a child forced by circumstances to work prematurely. This unfortunate probability transcends from generation to generation, hindering initiatives to eliminate child labor in its entirety [3]. The elimination of child labor must be a priority state policy, which must be institutionalized and integrated into all social agendas and national government programs [4]. To achieve a progressive elimination of child labor, international organizations, ministries, and commissions for the eradication of child labor in each country have agreed that it is necessary to adopt social, state, legislative, educational, cultural, and economic measures [5].

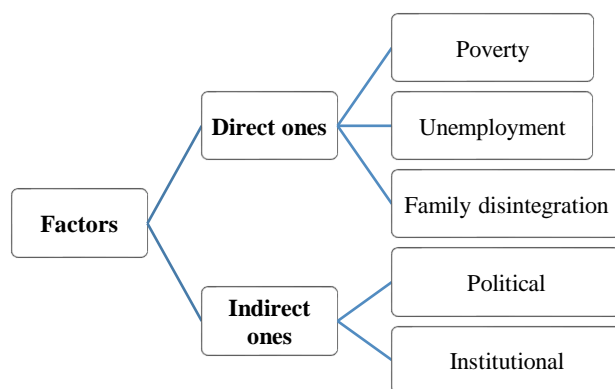
In the country, the minimum age to work legally is 15 years, as long as this does not affect the physical and psychological development and access to all rights of adolescents. To achieve a society of Good Living, it is necessary that children and adolescents stop working and recover their rights to study, play, receive medical attention and share with their families. In the diverse international and national regulations, as well as in the policy guidelines defined by the countries, there is no uniformity in determining the minimum age to socially, culturally, and legally accept child labor [1]. In this context, the United Nations system and the permanent secretariat of the International Labor Organization (ILO) define child workers as those who enter the labor market and perform excessive work at a very young age [6].

Work is the activity that dignifies us and allows us to lead a stable life, but when minors are immersed in it, it can be determined as a violation of human rights, since child labor harms the development of children, and adolescents and may affect their physical and moral integrity with damage that will probably last for a lifetime. Throughout history, it can be concluded that the origins of child labor date back to the 16th century when children

began to be integrated into mining operations since they had the perfect size to access spaces that an adult body could not reach. Then in the eighteenth century with the industrial revolution, it was considered that child labor was of vital contribution since minors have always helped their parents with household tasks. Therefore, at the time, it was not considered a problem since throughout history and in all kinds of cultures, for example in Latin America, children had always contributed to the home.

But some time later it did bring negative consequences since the heavy work left as a result that many children were disfigured or died when trying to perform certain dangerous jobs and that is where the slogan of child exploitation was born. And because of that in 1919, the ILO adopts a convention that prohibits the work of children under 14 years of age in the industrial sector. These activities must be carried out in appropriate conditions for their age, ability, physical condition, and intellectual development while respecting their moral and cultural values, and their rights to rest, recreation, and play.

Generally, child labor occurs in precarious conditions, children and adolescents are forced at an early age to carry out activities that place them in total vulnerability and risk their health and add the fact that their body is not fully developed and thus affecting their full growth and depriving them of growing in a healthy environment. All children and adolescents have the right to grow up in a healthy environment, that is, to live, study and play in healthy places. These factors are grouped into two large groups, the direct and indirect ones that bring together aspects of the family economy, socio-cultural aspects, and regional and national capacities to respond to this situation.



**Figure 2:** Most relevant factors. Source: own elaboration

Governments, parents, and citizens, in general, must become aware of the necessary elimination of the labor exploitation of children and adolescents due to the seriousness that it entails not only for the minor and his family but also for society. Among the consequences that derive from this phenomenon are the physical, psychological and social ones [7]. Until July 2011, Ecuador released 2,160 girls, boys, and adolescents from work in garbage dumps; being the first country in Latin America to eradicate child labor in these spaces. In 2012, 238 flower growers and 396 companies in the agriculture, livestock, hunting, and forestry branches were inspected and processes for the restitution of the rights of children and adolescents were managed. In addition, that same year it was possible to eradicate child labor in municipal slaughterhouses nationwide. [24, 25]

These achievements are constantly monitored by the Ministry of Labor Relations and since this year its work has been focused according to the danger and the highest incidence by branches of work in each province, to optimize the work of identifying and disassociating child labor according to the territorial problem. Additionally, the Child Labor Eradication Project implements the business network for a country free of child labor. It is a public-private alliance, framed in corporate social responsibility, which has the support of the United Nations Children's Fund (UNICEF). The Network seeks to develop strategies and exchange good practices for the eradication of child labor among the 15 member companies: National Telecommunications Corporation, OCP, El Comercio, Danec, Diners, Holcim, Petroamazonas, Telefónica-Movistar, Cementos La Farge, Poweron, ACE Seguros, Quito Electric Company, Pronaca, TANASA.

As an objective, it is proposed to investigate the causes of child labor. Therefore, it is necessary to raise awareness and sensitize an entire society so that together they can ensure the safety of children and adolescents who in the future can become great minds, humans who, with their contributions, help create a better world, a world where rights are not violated and where there is no doubt that dreams can come true.

## 2 Materials and methods

To apply the neutrosophic Iadov technique, the experts must base themselves on a linguistic evaluation system that shows their opinion [8] [9]. This system and its neutrosophic and numerical equivalents are shown in Table 3 [8] [10], [17], [18], [19].

Linguistic term	Single Value Neutrosophic Number	Scale
Clearly satisfied	(1; 0; 0)	3
More satisfied than dissatisfied	(1,0.35,0.35)	23
Indeterminate	I	1.5
More dissatisfied than satisfied	(0.35, 0.35, 1)	1
Clearly dissatisfied	(0;0;1)	0
Contradictory	(1;0;1)	2

**Table 3:** Evaluation system for experts. Linguistic terms are associated with their neutrosophic evaluation and score value. Source: [11]

The term I in neutrosophy is interpreted as a unit of indeterminacy. Another component of the method is the Iadov Logical Table, which assigns numerical values to three closed questions that are applied to the experts. If necessary, open questions can be applied to the surveys [12], [20], [21], [26], [27].

1st Question	Yes			I don't know			No		
	Yes	I don't know	No	Yes	I don't know	No	Yes	I don't know	No
<b>3rd Question</b>									
It is a consolidated research process	1	2	6	2	2	6	6	6	6
It is a partially consolidated research process	2	3	3	2	3	3	6	3	6
It does not matter to me	3	3	3	3	3	3	3	3	3
It is a less consolidated research process than it claims to be	6	3	6	3	4	4	3	4	4
It is an unconsolidated research process	6	6	6	6	4	4	6	4	5
I don't know what to say	2	3	6	3	3	3	6	3	4

**Table 4:** Derivation of Iadov's Logic table. Source: [11]

To survey the level of satisfaction of the experts, the Iadov neutrosophic technique was used. This technique is based on the use of single-value neutrosophic sets (SVNS) associated with linguistic variables or their ability to increase interpretability in recommendation models and the use of indeterminacy [13] [14]. The definition of SVNS is the following:

Let X be a universe of discourse. An SVNS A over X is an object of the form.

$$A = \{[x, u_a(x), r_a(x), v_a(x)]: \in X\} dA \{[x, u_a(x), r_a(x), v_a(x)]: \in X\}d \tag{1}$$

Where:

$$u_a(x): X \rightarrow [0, 1], r_a(x): X \rightarrow [0, 1] y v_a(x): X \rightarrow [0, 1] \text{ with } 0 \leq u_a(X), r_a(X), v_a(X) \leq 3, \forall x \in X$$

For convenience, a SVNN will be expressed as  $A = (a, b, c)$ , where  $a, b, c \in [0,1]$  and satisfies  $0 \leq a + b + c \leq 3$ . To find a SVNS set that describes multiple sets at once, aggregation operators are used. One of these operators is the neutrosophic weighted average (WA), which is defined as follows [12]. Let  $\{A_1, A_2, \dots, A_n\} \in SVNS(x)$ , where  $A_j = (a_j, b_j, c_j) (j = 1, 2, \dots, n)$ , the Neutrosophic Weighted Average Operator (WA) is calculated:

$$WA(A_1, A_2, \dots, A_n) = \sum_{i=1}^n [w_j, A_i] \tag{2}$$

Where:

$$WA(w_1, w_2, \dots, w_n) = \sum_{i=1}^n [w_j, A_i] \text{ is the vector of } (j = 1, 2, \dots, n) \text{ such that } w_n \in [0,1] y \sum w_j = 1$$

To deneutrosophicate this set so that a single value is obtained, a scoring function is usually used [15]. Let  $A = (a, b, c)$ , the score function S of an SVNS, based on the degree of indeterminate membership and the degree of false membership, is defined by the following equation:

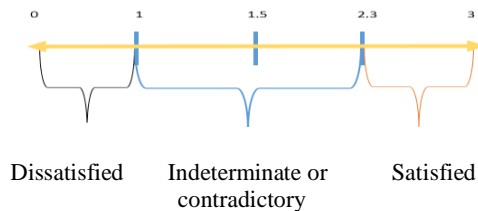
$$S(A) = 2+abc \tag{3}$$

For the use of an SVN<sub>S</sub> to measure individual satisfaction, this value must be associated with a linguistic variable [8]. Therefore, the scales shown in Table 2 were specified and the corresponding score was calculated using (3). For cases in which the evaluation corresponds to indeterminacy (not defined) (I), a process was developed.

$$\lambda([a_1, a_2]) = \frac{a_1 + a_2}{2} \tag{4}$$

To calculate the Global Satisfaction Index of the respondents (GSI), the WA aggregation operator (2) was used, taking into consideration the score values and that all the respondents have the same weight, so  $w_i = \frac{1}{n}$ . The instrument designed for the application of the survey was a questionnaire of five questions, of which three are closed (1, 3, and 5) and two are open (2 and 4). The three closed questions were related through the "Iadov Logic Table", which is presented in Table 3 [13] [9]. The algorithm used for the application of the neutrosophic Iadov technique is then the following:

1. Once the questionnaire has been applied, the corresponding value (from 1 to 6) for the satisfaction rating of the surveyed experts is found in Iadov's logical table of three inputs [9], [22], [23].
2. The linguistic variable, the SVN<sub>S</sub>, and the score according to Table 2 are matched to this value.
3. The score value of each respondent is used to calculate the group satisfaction index (GSI) from the aggregation of all the scores using the WA (2) aggregation operator formula.
4. The GSI is interpreted from the location of the value in the graph in Figure 1.



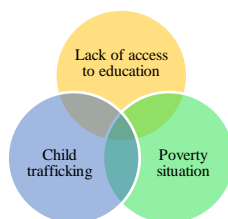
**Figure 3:** Scale for determining the level of satisfaction according to the scores used. Source: adapted from [16].

The two open questions allowed to complete the assessment of the level of satisfaction of the students with the applied methodology. These are the questions:

1. Do you consider that current regulations protect children and adolescents from child labor? (Question 1)
2. Do you consider that the scope should be developed and specify what elements should be present in the design of new policies? (Question 4)
3. What is your opinion about the economic policies developed by the state? (Question 5)
4. Do you think that campaigns could be developed to link infants to schools again? (Question 2)
5. What do you think about the special protection measures against any type of labor or economic exploitation? (Question 3).

### 3 Results

From the information obtained from the survey, it is possible to refer to the variables that must define the elements to be considered when evaluating the causes of child labor (see Figure 2) (see Table 5).



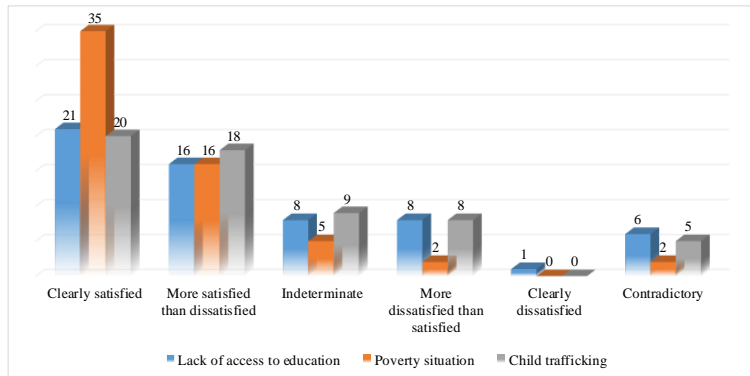
**Figure 4:** Sub-elements of the neutrosophic set of inequality. Source: own elaboration.

To mitigate the impact of child labor on children and adolescents, the evaluation of each element and sub-element must be analyzed to decide on a possible diagnosis within the neurosophic set called selective capture (see Table 5).

Code	Items	Sub-elements
E1	Lack of access to education	A poorly functioning education system is related to the proportion of working children. Accessibility and availability of educational resources.
E2	Poverty situation	Low income in the family pushes children to work. Loss of jobs.
E3	Child trafficking	Includes servitude, Organ trafficking.

**Table 5:** Elements of the neurosophic inequality set. Source: own elaboration.

From the application of the survey by the group of experts, the results were obtained regarding the individual satisfaction levels shown in Figure 3 and the information regarding the neurosophic group studied.



**Figure 5:** Levels of satisfaction of the group of experts for each element. Source: own elaboration.

Positive levels of satisfaction can be seen in the causes of child labor, with a predominance of the situation of poverty. However, experts are observed to be dissatisfied, especially with regard to child trafficking. Indeterminate and contradictory positions were also found, between the level of belonging of each element. Inequality increased both within and between countries, causing long-term impacts on access to opportunities and social mobility. The calculations of the GSI according to the frequency of observation and the individual satisfaction indices of the designed categories and their corresponding scores are shown in tables 6 to 8, for each group, respectively.

Linguistic term	SVNN	Scoring (S)	Frequency (F)	F*S	(F*S)/n
Clearly satisfied	(1; 0; 0)	3	18	54	0.90
More satisfied than dissatisfied	(1,0.35,0.35)	2.3	15	34.5	0.58
Indeterminate	I	1.5	10	15	0.25
More dissatisfied than satisfied	(0.35, 0.35, 1)	1	8	8	0.13
Clearly dissatisfied	(0;0;1)	0	3	0	0.00
Contradictory	(1;0;1)	2	6	12	0.20
Group Satisfaction Index					2.00

**Table 6:** Calculation of the Group Satisfaction Index (GSI) of the element Lack of access to education. Source: own elaboration.

Linguistic term	SVNN	Scoring (S)	Frequency (F)	F*S	(F*S)/n
Clearly satisfied	(1; 0; 0)	3	31	93	1.55
More satisfied than dissatisfied	(1,0.35,0.35)	2.5	14	35	0.58
Indeterminate	I	1.5	7	10.5	0.18
More dissatisfied than satisfied	(0.35, 0.35, 1)	1	5	5	0.08
Clearly dissatisfied	(0;0;1)	0	0	0	0.00
Contradictory	(1;0;1)	2	3	6	0.10
Group Satisfaction Index					2.58

**Table 7:** Calculation of the Group Satisfaction Index (GSI) of the Poverty Situation element. Source: own elaboration.

Linguistic term	SVNN	Scoring (S)	Frequency (F)	F*S	(F*S)/n
Clearly satisfied	(1; 0; 0)	3	23	69	1.15
More satisfied than dissatisfied	(1,0.35,0.35)	2.5	15	37.5	0.63
Indeterminate	I	1.5	10	15	0.25
More dissatisfied than satisfied	(0.35, 0.35, 1)	1	7	7	0.12
Clearly dissatisfied	(0;0;1)	0	0	0	0.00
Contradictory	(1;0;1)	2	5	10	0.17
Group Satisfaction Index					2.06

**Table 8:** Calculation of the Group Satisfaction Index (GSI) of the Child Trafficking element. Source: own elaboration.

Of the elements evaluated, only the *poverty situation* element is greater than 2.30, so it is established that the experts agree on integrating fighting economic inequality and low income as part of the process to eliminate child labor. As one of the primary requirements, it would imply drawing the attention of institutions and governments to the possible reductions in the world's absolute rate of poverty. For the elements: *lack of access to education* and *child trafficking*; there is a level of indeterminacy or contradiction between the sub-elements of each element of the neutrosophic set. Indeterminacy studies must be carried out for each sub-element and analyze the degree of belonging that affects the needs of children and adolescents.

These results obtained from the experts' satisfaction with the elements found in the collection set with the Iadov technique, were reaffirmed with the experts' answers to the open questions. Among the most frequent opinions, the lack of resources stands out as incidence variables. Among the contradictions, the experts refer that it is a consolidated process, although each sub-element must be defined and evaluated under conditions of subset and set in the inequality, but they can help to receive equal treatment regardless of social position or economic situation.

## Conclusion

Currently, child labor is seen as a problem, but national and regional capacities have not been sufficient to confront it. Although there is evidence of progress in policies and plans to confront child labor, its high incidence in Ecuador and the region shows the need to redouble efforts for its elimination. Early school leaving and early entry into work can negatively influence young people's paths to work.

Support the ability of the poorest families to protect their children from child labor. Establish cash transfer plans, access to bank loans, and health and education insurance. It should receive special treatment in the criminal legal system. The eradication of child labor largely depends on the political will of the governments, which have the necessary resources and decisions to design and implement projects and strategies to fight this problem.

Governments, parents, and citizens, in general, must become aware of the necessary elimination of the labor exploitation of children and adolescents due to the seriousness that it entails not only for the minor and his family but also for society. Child labor hinders access to education for minors; many are illiterate, and others do not finish their basic studies due to the abandonment of the classrooms.

## References

- [1] J. D. Fluke, L. Tonmyr, J. Gray, L. Bettencourt Rodrigues, F. Bolter, S. Cash, et al., "Child maltreatment data: A summary of progress, prospects, and challenges," *Child Abuse & Neglect*, vol. 119, p. 104650, 2021/09/01/ 2021.
- [2] D. S. Sonesson E, Burn AM, et al. Child Maltreatment. 2022 Mar:10775595221079308. DOI: 10.1177/10775595221079308. PMID: 35240863., " Leveraging Administrative Data to Better Understand and Address Child Maltreatment: A Scoping Review of Data Linkage Studies. *Child Maltreatment*. 2022 Mar:10775595221079308. DOI: PMID: , " Europe PMC, 2022.
- [3] E. Allen, "Norms and values: Faith-based advances in child protection," *Child Abuse & Neglect*, vol. 119, p. 104820, 2021/09/01/ 2021.
- [4] L. Williams, V. Gama, R. Oliveira, and S. D'Afonseca, "SOME CHALLENGES IN CHILD ABUSE PREVENTION IN A MIDDLE INCOME COUNTRY: THE BRAZILIAN PERSPECTIVE," *Child abuse & neglect*, vol. 119, p. 104720, 09/19 2020.
- [5] S. Raman, T. Muhammad, J. Goldhagen, R. Seth, A. Kadir, S. Bennett, et al., "Ending violence against children: What can global agencies do in partnership?," *Child Abuse & Neglect*, vol. 119, p. 104733, 2021/09/01/ 2021.
- [6] F. Wulczyn, A. Parolini, and S. Huhr, "Human capital and child protection: A research framework in the CRC context," *Child Abuse & Neglect*, vol. 119, p. 104610, 2021/09/01/ 2021.
- [7] V. Lidchi and A. Wiener, "How can services be improved to effectively address the mental health of vulnerable children and young people?," *Child Abuse & Neglect*, vol. 119, p. 104648, 2021/09/01/ 2021.
- [8] M. Leyva Vázquez and F. Smarandache, *Neutrosophía: Nuevos avances en el tratamiento de la incertidumbre*. Bruselas: Pons, 2018.
- [9] N. Batista, N. Valcárcel, M. Leyva-Vázquez, and F. Smarandache. (2018) Validation of the pedagogical strategy for the



- formation of the competence entrepreneurship in high education through the use of neutrosophic logic and IADOV technique. Vol. 22. Neutrosophic Sets and Systems.
- [10] J. L. Salmeron and F. Smarandache, "Redesigning Decision Matrix Method with an indeterminacy-based inference process. Multispace and Multistructure. ", Neutrosophic Transdisciplinarity (100 Collected Papers of Sciences), vol. 4, p. 151, 2010.
- [11] V. V. Falcón, J. L. T. Espinoza, A. R. L. Yacelga, and L. O. A. Zambrano, "Managing Contradictions in Software Engineering Investigations using the Neutrosophic IADOV Method," *Neutrosophic Sets and Systems*, vol. 44, pp. 100–107, 2021.
- [12] M. A. Andino-Herrera, Cuenca-Díaz, H. Paronyan, and V. Murillo. (2019) Use of the neutrosophic IADOV technique to diagnose the real state of citizen participation and social control, exercised by young people in Ecuador. *Neutrosophic Sets and Systems*, 26. 169-173.
- [13] L. Guerrero Morales, R. W. Proenza Ventura, and A. H. González. (2019) Iadov Neutrosófico para medir la satisfacción de los docentes con la aplicación del Solver de Excel en la programación lineal. . *Neutrosophic Computing and Machine Learning*, Vol. 5. 14-25.
- [14] M. G. M. E.-h. Abdel-Basset, A.; Smarandachec, F., A novel model for evaluation Hospital medical care systems based on plithogenic sets," vol. 100,: *Artif Intell Med*, 2019.
- [15] A. S. W. Alfredo-Cacpata, Gil-Betancourt, N. J. Enríquez-Guanga, and K. T. Castillo-Núñez. ( 2019) Validation of the proof reversal on the inexistence of untimely dismissal by using neutrosophic IADOV technique. *Neutrosophic Sets and Systems*, 26(Special Issue: Social Neutrosophy in Latin America), 45-51.
- [16] V. V. Falcón, J. L. T. Espinoza, A. R. L. Yacelga, and L. O. A. Zambrano. (2021) Managing Contradictions in Software Engineering Investigations using the Neutrosophic IADOV Method. *Neutrosophic Sets and Systems*. 100-107.
- [17] B D. Narváez Montenegro, F.J Caicedo Banderas, E. J. Naranjo Luzuriaga & F. D. Guaigua Vizcaíno. "El goce de la licencia de maternidad en el Ecuador". *Universidad y Sociedad*, Vol. 14 Num. S2, pp- 379-384, 2022.
- [18] W. A. Cacpata Calle, V. V. Ponce Meza, A. S. Gil Betancourt, & J. P. Pardo. "La conciliación como mecanismo de justicia restaurativa en el delito de robo: cantón Santo Domingo". *Universidad y Sociedad*, Vol. 14 Num. S2, pp- 373-378, 2022
- [19] A L. Santillán Molina, N. V. Vinueza Ochoa & C. F Benavides Salazar. "La infracción al deber objetivo de cuidado en el proceso de Hardening". *Universidad y Sociedad*, Vol. 14 Num. S2, pp- 364-372, 2022.
- [20] M. M Vidal del Río & A. A. Monsalve Guamán. "Babesiosis humana, una zoonosis emergente". *Universidad y Sociedad*, Vol. 14 Num. S2, pp- 358-363, 2022.
- [21] I A. Cruz Piza, L. J. Bajaña Bustamante & M. O Morales Campoverde. "Derechos de la naturaleza en Ecuador". *Universidad y Sociedad*, Vol. 14 Num. S2, pp- 351-357, 2022.
- [22] R. A. Diaz Vásquez & A. R. León Yacelga. "La gestión de producción del hato lechero de la finca "Playa Alta" del cantón Tulcán a través de una aplicación Web". *Universidad y Sociedad*, Vol. 14 Num. S2, pp- 344-250, 2022.
- [23] R. A. Diaz Vásquez & A. R. León Yacelga. "Alternativa tecnológica de seguridad comunitaria en tiempos actuales". *Universidad y Sociedad*, Vol. 14 Num. S2, pp- 337-343, 2022.
- [24] Estupiñán Ricardo, J., Martínez Vásquez, Á. B., Acosta Herrera, R. A., Villacrés Álvarez, A. E., Escobar Jara, J. I., & Batista Hernández, N. "Sistema de Gestión de la Educación Superior en Ecuador. Impacto en el Proceso de Aprendizaje". *Dilemas Contemporáneos: Educación, Política y Valores*, 2018.
- [25] Estupiñán Ricardo, J., Leyva Vázquez, M. Y., Marcial Coello, C. R., & Figueroa Colin, S. E. "Importancia de la preparación de los académicos en la implementación de la investigación científica". *Conrado*, vol. 17 no. 82, pp 337-343, 2021.
- [26] von Feigenblatt, O. F. "Education, culture, and underdevelopment: Haiti's tragic failure". *Universidad y Sociedad*, vol. 14 no. 3, pp 604-611, 2022.
- [27] von Feigenblatt, O. F., Peña-Acuña, B., & Cardoso-Pulido, M. J. "Aprendizaje personalizado y education maker: Nuevos paradigmas didácticos y otras aproximaciones". *Ediciones Octaedro*, 2022.

**Received:** August 06, 2022. **Accepted:** October 07, 2022