Neutrosophic model for the analysis of the causes

that lead to tax fraud

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Abstract. Economic fraud has been a crime little controversial in the media and social networks, because it is classified as one of the white-collar crimes, which are those that are committed by economic powers. For such a reason, the objective of this investigation is to carry out an analysis of the causes that lead to tax fraud. Making use of Neutrosophy, for the sake of recommending the causes to keep in mind to make a distinction of those more used in the administrative sanctions according to what is stipulated by Article - 298 of the Integral Organic Penal Code, in Ecuador. For gathering the information, we used qualitative techniques such as the bibliographical revision, as well as the not participant observation of the news to buy the doctrine with the facts of social shock. The main result is the determination of the privation of freedom in cases that the tax fraud constitutes crime.

Keywords: Fraud, accounting, punishment, crime, falsification, simulation, neutrosophic model.

1 Introduction

It is important for the development of this topic and its respective analysis to understand that a tax fraud crime can be deceitful or wrongful, this way being able to identify the graveness of each delinquent behavior established in the Integral Organic Penal Code (COIP) in tributary matter[1]. Therefore, we may say that deceit is present, so the person that incurs in tax evasion does it to obtain wealth in his own benefit, from money that belongs to the State to make effective the common good.

In tax matters, constitutes a fraud all deceitful act of simulation, concealment, omission, falsehood or deceit that leads to error in the determination of the tax obligation, or for what is evaded to pay totally or partly the actual tributes, in own benefit or in that of a third. As well as those deceitful behaviors, that contravene or hinder the control works, determination of sanction exercised by Tax Administration [2].

The lack of transparency, scarce cooperation, delivery of almost null information, create favorable conditions so that they can accumulate enormous capitals of unknown origin and in many illicit cases in abroad institutions. Tax fraud constitutes material object of money laundering crime, ratifying the accountant's penal responsibility as the author of the fraud, inclusive if he has not acted with expressed command. That's why, legal representatives and the accountant, regarding the declarations or other actions they make, will be held responsible as authors of the tax fraud in the legal or natural person's benefit. Without damage of the responsibility of the partners, shareholders, employees, workers or professionals that have participated deliberately in this fraud, although they have not acted under any command[3].

In front of the doctrinal opinion, a relationship between the tax fraud and the money laundering crime, it is been analyzed the possibility to determine the existence of a tax fraud crime when the profits coming from a money laundering crime are hidden to the tax administration. That is, in this scenario, they have been debating if the illicit patrimonial increment (that constitutes the material object of the money laundering crime) should be subject to taxes. Second, they discuss the possibility of the obtained earnings of a tax fraud may be object of money laundering [4].

The discussion in Spain about the legal penal good in the crime of tax fraud in particular, and in the crimes against the Public Treasury in general, is confronted between the patrimonial and functional thesis, being appropriate to approach a material concept in the crime of tax fraud starting from considering the Criminal Law as protector of juridical goods[4] .

In Peru, they began a process of permanent pursuit of cases that are firmly sentenced to convictions for fraud crime (false bills). This indicator shows their interest in fighting against fraud cases and organizations selling false invoices, which is a very important evasion way. It is worth pointing out that there are very few tax fraud crimes cases with a firm sentence. It is considered that the Legal Power has to be more effective, it is another of the reformations that should be done since up to this date there are very few firm sentences through the legal way of punishment for tax fraud. It is proposed, as a legislative initiative, the urgent specialization of the criminal courts in tax matters for it would contribute in a great way to decrease the tax fraud crimes having the tax evasion as its main cause [4].

The principle of law reservation has been instituted at Constitutional level. In Bolivia, they have a minimum system of law reservation, since it attributes to the assembly the obligation of legislating in both the noun and adjective ambit. In Ecuador, we may observe surveillance of the infra legal normative acts regulating nouns aspects of the Criminal Law. A matter that has come to commit the principle of law reservation in this sense and with a hierarchically inferior range, we have the case of the ordinance of the Metropolitan District of Quito on public shows. In addition, it is evidenced that in the criminal law for administrative infractions, deprivation of liberty is not considered, because it is reserved for bigger crimes. It is recommended, in the Organic Code of Territorial Organization, Autonomy and Decentralization (COOTAD), to clearly establish the powers and competencies that are delegated to the levels of sectional government, so that they do not overstep in the creation of taxes .

Theory of duty Infraction is sustained by the fact that the duty being protected it is that of contributing with the State in the maintenance of the public expenses, which is supported by numeral 15 of article 83 of the Constitution of the Republic. For the existence of tax fraud crime, the subjective element "deceit" should be present. In consequence, those infractions whose deceitful behavior cannot be proven may be categorized as administrative infractions (regulation breaches) established in the Tax Organic Code, but not as fraud. Nevertheless, Ecuador is a constitutional State of rights and justice that should guarantee the citizens their right to the presumption of innocence[5].

Tax is an obligation originated centuries ago, there are even biblical quotations referring to it. Today, Ecuador has to take the road to the adoption of a tax culture. It is necessary to insist on the intent of an awareness process, even more when our idiosyncrasy is in the middle of it. Not as much as a decrease of our self-esteem but for the ancestral habit for the evasion. Therefore, the tribute seen from the pure meaning of the word is an imperative of the civilized societies, where everyone must consciously contribute with the state to improve the standard of life[6].

Educational strategies are very relevant to develop a tax conscience and moral of the citizens through the training, developing in individuals the knowledge about the duties and rights for taxpayers in a tax system. As well as the creation of ethical values, to establish a detailed and integral understanding on the fiscal norms, guided to the voluntary payment of the taxes. Playing an active part, not only in the cancellation of the obligations as for the investment of resources and the evasion by entities or fellows belonging to a society that conceive a detriment in the social goods[7] .

Throughout this study, we will carry out a clear analysis on the tax fraud, a crime that is declared in article 298 of the Integral Organic Penal Code due to its paramount importance. It is erroneously believed that carrying out some of the acts described in this work would lead to just an administrative and pecuniary sanction, when in fact doing so would be incurring in a crime that derives in privation of freedom sanctions.

Based on analysis related to the crimes committed in the tax fraud field, in this study we make use of Neutrosophy to analyze the causes that lead to tax fraud, to recommend the causes to keep in mind to make a distinction on those more common in administrative sanctions. The study from Neutrosophy contributes to the treatment of the neutralities, to treat the non-determination present in the information for the support to decision-making. Neutrosophy has created the bases for a series of mathematical theories that classic and diffuse theories generalize, such as Neutrosophic sets and logic[8][9].

2 Materials and methods

We carried out a non-experimental descriptive investigation. Starting with the use of qualitative techniques as base of the study for the appropriation and understanding of concepts and theories related to the investigation, information, texts, legal regulations and other documents, using bibliographical records that facilitated the development of the discussion and the obtaining of results. Bringing into debate the causes leading to tax fraud. Specifically, through the observation of the situations that took place in Ecuador, particularly based on the revision of news broadcasted in the national media, in order to relate them to the bibliographical foundation.

We also identified deficiencies in the causes that are frequently used to configure tax fraud crime, each one with their own rector verbs and constituent elements, for which a Neutrosophic recommendation model was designed. Which is useful in the decision-making process since it provides a group of options that are expected to satisfy its expectations [10].[11]

This investigation proposes a recommendation model based on the knowledge of the analysis of the causes that lead to tax fraud, using single value Neutrosophic numbers (SVN) which allows the use of linguistic variables [12].

For our case study, having X as the speech universe and a SVNS A over X which is an object defined as follows:

$$A = \{\langle x, (x), r(x), vA(x)\rangle : x \in X\} \ d \qquad\qquad (1)$$

Where $uA(x): X \rightarrow [0,1]$, $rA(x), :X \rightarrow [0,1]$ y $vA(x): X \rightarrow [0,1]$ with $0 \leq uA(x) + rA(x) + vA(x): \leq 3$ for every $x \in X$.

The interval (x), $rA(x)$ y $vA(x)$ represents the true, uncertain and false memberships of x in A, respectively. For the sake of convenience a number SVN will be expressed as $A = (a, b, c)$, where $a, b, c \in [0,1]$, y + b + c ≤ 3.

In this research, the recommendation pattern is made starting from the information of the analysis of the causes that lead to tax fraud. In particular, a content-based recommendation pattern is used, where they learn from the stored profiles about the causes that lead to tax fraud in Ecuador and the profiles whose characteristics are present in the causes that configure the tax fraud in Ecuador, particularly those that correspond to article - 298 of the Integral Organic Penal Code in Ecuador.

The proposed pattern is shown in figure 1. It is based on the proposal of Cordon [12] for the knowledge-based recommendation systems, which allows to represent linguistic terms and non-determination by means of SVN numbers.[13]
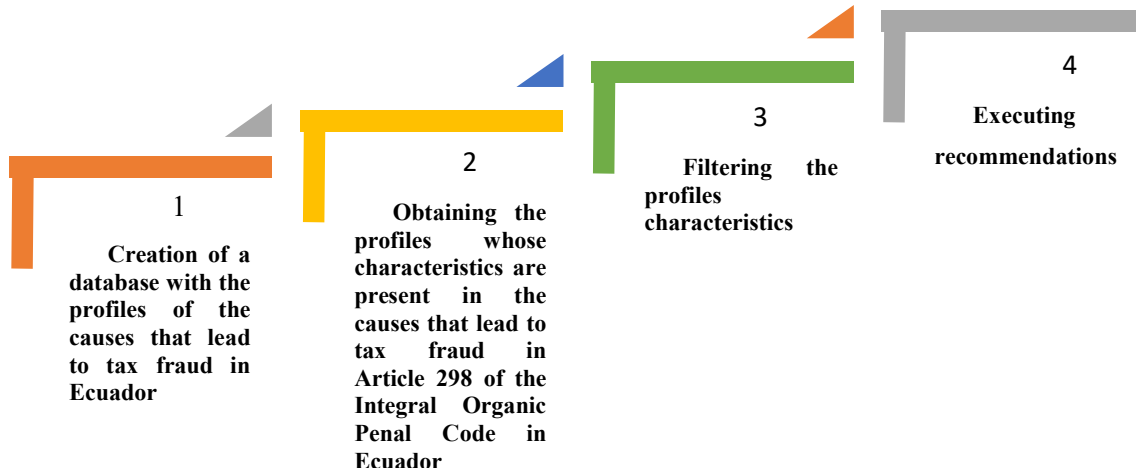

1

Creation of a database with the profiles of the causes that lead to tax fraud in Ecuador

2

Obtaining the profiles whose characteristics are present in the causes that lead to tax fraud in Article 298 of the Integral Organic Penal Code in Ecuador

3

Filtering the profiles characteristics

4

Executing recommendations

Figure 1. Recommendation pattern starting from the information of the analysis of the causes that lead to tax fraud in Ecuador.

1. Creation of a database with the profiles of the causes that lead to tax fraud in Ecuador

In this component we create the database that will contain the profiles of the characteristics of the causes that lead to tax fraud in Ecuador. Each profile will contain the causes, which will be represented as ai. These profiles describe the group of characteristics related to the causes that lead to tax fraud in Ecuador.

$$C=\{c1,\dots,ck,\dots,cl\} \qquad (2)$$

The characteristics of the profiles of the causes that lead to tax fraud in Ecuador, stored in the database previously created, are obtained by means of Neutrosophic single value numbers (SVN) [14]. These characteristics are evaluated considering that $A* = (A1* , A2* ,..,An*)$ is a vector of SVN numbers that corresponds with the characteristics of the causes that lead to tax fraud, such that $j *=(aj*, bj*, cj*)$ j=(1,2, ..., n) and $Bi = (Bi1, Bi2, \dots, Bim)$ $(i = 1,2, \dots, m)$ when there are several vectors (m) corresponding with n SVN numbers such that and $Bij = (aij, bij, cij)$ $(i = 1,2, \dots, m)$, $(j = 1,2, \dots, n)$. Euclidean distance can be measured with the purpose of obtaining a measure of similarity among the stored characteristics.

Euclidian distance calculation is carried out according to equation 3, which is defined b as:

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

Based on Euclidian distance calculation a measure of similarity is defined, as referred by [15]. With the result of this calculation, we analyzed the approach of the characteristic of the causes that lead to tax fraud Ai, being noteworthy that the smallest the distance of the characteristic of the causes (si) the bigger the similarity. Which allows sorting the characteristics of the causes that lead to tax fraud [16].

Profile may be obtained in a direct way based on experts' criteria using equation 4.

$$F_{a_j} = \left\{ v_1^j, \dots, v_k^j, \dots v_l^j \right\}, j = 1, \dots n \qquad (4)$$

The assessments of the characteristics of the causes that lead to tax fraud in Ecuador, aj, are expressed using the linguistic scale, where:

S= {s_1, ..., s_g} is the set of defined linguistic terms to assess the characteristics c_k using SVN numbers.

In this study, linguistic terms are defined once described the set of $S, v_k^j \in S$ products, through the use of expression 5.

$$A=\{a_1,...,a_j,...,a_n\} \tag{5}$$

2.   Obtaining the profiles whose characteristics are present in the causes that lead to tax fraud in Article-298 of the Integral Organic Penal Code in Ecuador

In this component, we obtained the information of the profiles whose characteristics are present in the causes that lead to tax fraud in the article - 298 of the Integral Organic Penal Code, in Ecuador. These profiles are stored in the database and are mathematically represented by expression 6.

$$P_e = \{p_1^e, ..., p_k^e, ..., p_l^e\} \tag{6}$$

Each profile will be integrated by a set of attributes, mathematically represented as shown in expression 7

$$C^e = \{c_1^e, ..., c_k^e, ..., c_l^e\} \tag{7}$$

where: $c_k^e \in S$

The value obtained using the so-called conversational approach or through examples that can be adapted according to [14].

3.   Filtering characteristics of the profiles

In this component, we filter the characteristics of the profiles of the causes to make a distinction of those more used in the administrative sanctions according to what defines Article - 298 of the Integral Organic Penal Code in Ecuador.

With that purpose, the similarity *S* is calculated, among the profiles of the causes that lead to tax fraud in Ecuador and the profiles whose characteristics are present in the causes that lead to tax fraud in Ecuador. In particular, those that correspond with Article - 298 of the Integral Organic Penal Code in Ecuador. Those profiles are denoted by *Pe*. The characteristics are represented as *aj* [16] and they are the ones stored in the database, where the calculation of the total similarity is carried out, which is mathematically represented through expression 8.

$$s_i = \left(1 - \frac{1}{3}\sum_{j=1}^{n}\left\{\left(\left|a_{ij}-a_j^*\right|\right)^2+\left(\left|b_{ij}-b_j^*\right|\right)^2+\left(\left|c_{ij}-c_j^*\right|\right)^2\right\}\right)^{\frac{1}{2}} \tag{8}$$

4.   Executing recommendations

Calculated the similarity among the values of the characteristics of the profiles on the causes that lead to tax fraud in Ecuador and the profiles whose characteristics are present in the causes that lead to tax fraud in Ecuador, in particular those that correspond with Article - 298 of the Integral Organic Penal Code. These characteristics are sorted according to the similarity obtained and they are represented by the vector of similarity described in expression 9.

$$D=(d1,...,dn) \tag{9}$$

Best characteristics will be those that better satisfy the needs of the profiles of the causes that lead to tax fraud in Ecuador. That is, the ones with bigger similarity.

3 Results

The result of this investigation is the identification of each cause so that the tax fraud crime is configured developing 18 causals, each one with its own rector verbs and constituent elements. The causes identified having more incidence and leading to tax fraud crimes are:

1.   Use of false identification or identity in the application for registration, updating or cancellation of the records kept by the tax administrations.
2.   Use of false or adulterated data, information or documentation in the application for registration, updating or cancellation of the records kept by the tax administrations.
3.   Execution of activities in an establishment knowingly that it is closed.

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4. Use of sales or retention vouchers or complementary documents that are not authorized by the Tax Administration.
5. Provide the tax administration with reports with false data, figures, goods, circumstances or false, incomplete, distorted or adulterated records.
6. Make statements in the tax returns of false, incomplete, defaced or adulterated data, provided that the taxpayer has not exercised, within one year after the declaration, the right to submit the substitute statement in the manner provided by law.
7. Falsification or alteration of permits, guides, invoices, records, marks, labels or any other type of control of production, consumption, transport, import and export of burdened goods.
8. Alteration of settlement in accounting books or registers of accounts, of operations related to economic activity, as well as the accounting record of false accounts, names, amounts or data.
9. Double accounting with different entries in books or computer records, for the same business or economic activity.
10. Total or partial destruction of books or computerized accounting records or other regulations required by tax or the documents that support them, to evade payment or decrease the value of tax obligations.
11. The sale for consumption of uncorritated liquor or alcohol without bottling which leads to falsely declaring the volume or alcoholic degree of the product subject to the tax, outside the tolerance limit established by the INEN. As well as the sale outside the quota established by the Service of Internal Revenue, of the ethyl alcohol destined to the manufacture of alcoholic beverages, pharmaceutical products and eau de toilet.
12. The issuance or acceptance by the tax administration of sales receipts, retention or supplementary documents for non-existent operations or whose amount does not coincide with that corresponding to the actual operation.
13. Emission of sale vouchers for operations carried out with company's ghosts, non-existent or supposed.
14. The presentation to the tax administration of sales receipts for operations carried out with ghost or nonexistent companies.
15. The omission of income, which includes costs, expenses, deductions, exemptions, rebates or withholdings that are false, nonexistent, or superior to those that proceed legally, to avoid paying the corresponding taxes.
16. The extension to third parties of the benefit of a right to subsidies, rebates, exemptions, fiscal stimuli or benefit from them without rights.
17. The simulation of one or more acts, contracts to obtain or give a benefit of subsidy, reduction, exemption or fiscal stimulus.
18. The existence of a lack of deliberate, total or partial delivery by the agents of withholding or collection of taxes withheld or received, after ten days of expiration of the term established in the standard to do so.

It is important to indicate that the tributes retained by the retention or perception agents is money that belongs to the State and for that reason to the whole collective, therefore, failure to comply with the payment in the terms and conditions established by law, is one of the penal types of tax fraud. They are considered as withholding or collection agents by regulation, administrative or legal mandate for which they must retain VAT and / or INCOME and the tax withheld or received must be paid to the State within the corresponding time.

Natural or juridical persons forced to register accounting are those that have to act as retention agents' or perception. The concept of agents of retention and perception are established in Art. 29 of the Tax Code, art. 45 of the Internal Tax Regime Law.

Retention agents are natural or legal persons who, because of their activity, function or employment, are in a position to withhold taxes because, by legal mandate, regulatory provision or administrative order, are obliged to do so.

Similarly, perception agents are the natural or legal persons who, because of their activity, function or employment, and by mandate of the law or regulation, are obliged to collect taxes and deliver them to the active subject.

These characteristics are analyzed through a Neutrosophic model based on the recommendation pattern developed by [17]. For our case study and making use of the previously created database that stores the characteristics of the study profiles, the vector that represents the causes having similarity among the profiles stored in the database is used.

These causes are the ones that lead to tax fraud and the more used in the administrative sanctions according to that defined by Article - 298 of the Integral Organic Penal Code in Ecuador. They can be expressed as:

$A= \{a1,a2,a3,a4,a5,a6,a7,a8,a9,a10,a11,a12,a13,a14,a15,a16 \}$

They are described by the set of attributes:

C= {c1,c2,c3,c4,c5, c6,c7,c8,c9,c10,c11,c12,c13,c14,c15,c16}

The attributes will be valued in the linguistic scale shown in table 1. The assessments are stored in the previously created database.

Linguistic terms	SVN Numbers
Extremely good (EG)	(1,0,0)
Very very good (VVG)	(0.9, 0.1, 0.1)
Very good (VG)	(0.8,0.15,0.20)
Good (G)	(0.70,0.25,0.30)
Moderately good (MDG)	(0.60,0.35,0.40)
Medium(M)	(0.50,0.50,0.50)
Moderately bad (MDB)	(0.40,0.65,0.60)
Bad (B)	(0.30,0.75,0.70)
Very bad (VB)	(0.20,0.85,0.80)
Very very bad (VVB)	(0.10,0.90,0.90)
Extremely bad (EB)	(0,1,1)

Table 1: Linguistic terms used by [15].

In order to receive the recommendations, information is provided according to the similarity obtained from the profiles analyzed on the causes that constitute the tax fraud. Based on the characteristics of each identified cause, the causes used in the administrative sanctions are obtained as established by Article - 298 of the Integral Organic Penal Code in Ecuador, outstanding the causes:

A= {*a*4,2,*a*1,*a*3,*a*8,*a*6,*a*7,*a*5}

The similarity between the profiles of the causes that lead to tax fraud in Ecuador and the profiles whose characteristics are present in the causes that lead to tax fraud in Ecuador, in particular those that correspond to article - 298 of the Integral Organic Penal Code, are the ones shown in table 2.

*a*4	*a*2	*a*1	*a*3	*a*8	*a*6	*a*7	*a*5
0.54	0.86	0.52	0.84	0.42	0.92	0.44	0.89

Table 2: Similarity between products and user's profile.

Based on the results shown in table 2, the recommendation is made on the causes to be taken into account to make a distinction between the most used administrative sanctions as established by Art. 298 of the Integral Organic Penal Code in Ecuador. They are evaluated through linguistic terms represented in table 1, their result in linguistic terms is:

Pe={G,VG,G,VG,MDG,VVG,MDG,VG}

A sorting of causes is:

{*a*6, *a*5, *a*3, *a*2, *a*4, *a*1, *a*7, *a*8}

In case the recommendation is made for the causes to be taken into account to make a distinction of the most used in administrative sanctions as established by Art. 298 of the Integral Organic Penal Code in Ecuador, these will be the ones with bigger weights, being selected the causes shown in the following vector:
*a*6, *a*5, *a*2, *a*3.

On the other hand, it is necessary to highlight that the approaches of [7] are asserted. And it is proposed to carry out a bigger control of tax performance of the taxpayers, on behalf of the tax Administrations, in order to discourage the population from nonfulfillment. The Constitutional Court should also declare the unconstitutionality of the cases classified as tax fraud that are opposed with the principles of the tax regime and principles of the proper process defined in the Constitution of the Republic of the Ecuador. And to repeal the juridical suppositions established in numeral 3, 4 and 10 of the Integral Organic Penal Code as tax fraud since they infringe the principle of minimum penal intervention; and classify them as administrative contraventions in the Tax Organic Code.

Conclusions

It is pertinent to conclude that tax fraud is constituted as an offense sanctioned by the current normative criminal law. A person older than 18 years-old can be punishable when he does not legally comply with the provisions of the tax legislation and, consequently, will incur in the causes defined in Article 298 of the Integral Organic Penal Code.

In essence, tax fraud is committed through concealment, which are undeclared or omitted income, or not to submit to tax control agencies the amount of withholding or payment of taxes that may have been made within the period established by law.

Taxpayers who incur in this crime may also be subject to fines according to the severity of the crime.

A neutrosophic model was constructed for the analysis of the causes that lead to tax fraud in Ecuador. 18 causes were detected, out of which the model recommends taking into account the causes 6, 5, 2, 3, which are the more frequently used in administrative sanctions as established by Article 298 of the Integral Organic Penal Code in Ecuador.

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