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Electronic Payments in Decentralized Autonomous Municipal Governments of Ecuador. Decision Making through Plithogenic Logic

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Abstract. With the constant technological changes and their exponential growth due to the use of numerous applications, you can see the expansion of the electronically paid quotas which added to the organizations that experience a considerably greater misrepresentation, as well as the expansion of the quotas made with the Visa that was added to this development. Extortion can be characterized as a criminal behavior executed to obtain advantages related to money without reflecting on the results of this demonstration. Therefore, the development of an age adjustment was proposed to limit the problem using individual and regulated calculations that depend on AI strategies. The arrangement also considered excavation methods for handling information. The research used information from a public organization that relied on information from outside organizations to conduct banking transactions. For the complete system development, PHP was used as the programming language and PayPal as a transactional method or payment gateway due to the security it offers between transactions. For the development of the topic, we used mathematical modeling for decision making through Neutrosophic Logic and Plithogenic Logic.

Keywords: PHP, PayPal, Software Development, Neutrosophic Logic, Plithogenic Logic

1 Introduction

In the study presented by [1], the author has tried to analyze the cash transaction process, the importance of the cash transaction. He examines how information technology plays a vital role in the cashless economy and explains the impact of cashless transactions on the business process and the educational process. In [2], the personal experiences of customers and the use and level of awareness of customers towards electronic payment have been examined. Determine the variety of facilities that are available for online payment. On [3], it is determined that the electronic payment system improves people's quality of life and most commercial companies that accept electronic payments for their business transactions. In [4], they studied the prospect of digital payments and the opportunities and challenges of electronic payments in India and summarizes the initiatives taken by the government and India to promote electronic payment or digital payment.

The growth of information and communication technologies is persuading people and supporting the achievements of human society as a whole, and these are reinforced by the vast amount of available information and awareness about the use of various types of technologies [5]. Digitization has broken the traditional boundaries of society and provided creative and dynamic wings for business growth [6]. The digital revolution enables people to live life with ease and conduct convenient financial transactions. Banks enthusiastically adopted the electronic payment system as a method of financial transactions and created a convenient money transaction tool. Electronic payment is one of the prominent pillars of e-commerce and has become an integral part of the electronic commerce system. The efficient implementation of monetary policies and transactions in the money market depends on the electronic payment system. The electronic payment system influences the country's financial and economic system. Electronic payment became a monetary instrument for people to carry out their economic activities. Electronic payment is part of the economic infrastructure and plays a vital role in liquid transactions. The electronic payment system allowed the settlement infrastructure to be transferred from one person to another in a short period. Building an electronic payment infrastructure can be an excellent platform for future growth [7, 8].

As mentioned on the website of the Central Bank of Ecuador, "The Online Payment System has as its main characteristic that of incorporating a gross settlement scheme in real-time, being able to demand relatively high amounts of liquidity during the day, since the participants need sufficient liquidity to cover their payments. Under this consideration, the normal flow of payments will depend on whether the level of liquidity available to the ordering institution is adequate, concerning the value and distribution of pending payments, in such a way that delays to individual payments are avoided and at the same time risks related to uncertainty regarding the level of

short-term liquidity are minimized" [9].

In recent years, e-commerce in Ecuador has grown rapidly and the perception of consumers towards electronic payment is also changing, but the lack of awareness about electronic payment is not an easy task. Most people cannot buy smartphones or laptops which play a very important role in electronic payment. People still fear the security of electronic payment and fear restricting themselves to adopt electronic payment.

Electronic payment is a method of payment through an electronic network. Digital payments are payments directly to the payee from the payer's bank account using security features. Electronic payments are financial transactions between the buyer and the seller over the Internet. Electronic payments are based on digital financial instruments and backed by banks.

According to the Organic Monetary and Financial Code (2014), "electronic funds transfer" is any transfer of funds initiated by a person through instruction, authorization, or order to a bank to debit or credit an account maintained in that bank through electronic means, and includes transfers at the point of sale; ATM transactions, direct deposit or withdrawal of funds, transfers initiated by phone, Internet, and card payment.

Electronic payment systems are essential mechanisms used by individuals and organizations as a safe and convenient way to make payments over the Internet and, at the same time, a gateway to technological advancement in the world economy. In addition, it has also become the main part of e-commerce through which the success of e-business was based. The electronic payment system has also brought efficiency, reduced fraud, and innovation to the global payment system. However, despite the merits of electronic payment, it is essential to measure consumer satisfaction to make further corrections.

Payment methods are not only available for online purchases. Public entities have chosen to integrate this method for the collection of taxes, fees, and basic services to avoid crowds in public establishments. It can be clearly defined that some state institutions offer these types of services, but not all of them [10].

Given the case of the Municipal Decentralized Autonomous Government (DAG) of San Pedro de Pelileo, a relatively small state entity, which begins to have problems due to the number of taxpayers who request to cancel the values on property payments, these can be urban or rural and each of them you have estimate values established by each administration according to appraisals, patent payments and payments for drinking water consumption [10, 11].

For the development of the study, mathematical modeling for decision making was applied using Neutrosophic Logic and Plithogenic Logic. Neutrosophic sets are part of Neutrosophy, which studies the origin, nature, and scope of neutralities and their interactions with different ideational spectra. Neutrosophic sets are relatively new extensions of fuzzy intuitionist sets, while Plithogeny advocates the connections and unification of theories and ideas in varied fields of science, as it is an extension of the classical set, fuzzy set, fuzzy intuitionist set, and neutrosophic set [12-24].

2 Methods

A qualitative-quantitative method was used since interviews were established for the director of the systems department and a public collection official. In addition, the information is described through a survey directed to the taxpayers of the Municipal DAG of San Pedro de Pelileo. We work with a sample of 279 people from a population of 6450 taxpayers. It should be noted that these are registered in one of the databases of the Municipal DAG of San Pedro de Pelileo.

The inductive method determined the characteristics, parameters, and relationships that would exist between the mobile software and the final taxpayers who are the citizens of the Pelileo canton. For the development of the research, we used the deductive method that can be evidenced in the analysis of the management processes of inquiries and payments that the Municipal DAG of San Pedro de Pelileo currently provides to taxpayers in general, and through this, we obtained the information necessary to make a diagnosis about the deficiencies that can be found in this process.

A survey was applied to the taxpayers of the canton of Pelileo to obtain information, which contributed significantly to the solution of the defined problem. An interview was applied to the director of the systems department and a public official who manages the consultations and payments of the Municipal DAG of San Pedro de Pelileo, in order to collect relevant information, which contributed significantly to the proposal of an adequate solution to the research problem.

2.2 Mathematical modeling through Neutrosophic Logic to Plithogenic Logic

Neutrosophic sets were introduced in the literature by F. Smarandache since fuzzy intuitionistic sets could only handle incomplete information, but not the indeterminate and inconsistent information, which commonly exists in fuzzy systems. Neutrosophy means knowledge of neutral thought, and this neutrality represents the main

distinction between fuzzy logic and fuzzy intuitionist [12, 16, 25-28].

In neutrosophic sets, the indeterminacy is explicitly quantified through a new parameter I. True membership (t), indeterminate membership (I), and false membership (F) are independent of each other and the sum among them satisfies the inequalities $0 \leq T + I + F \leq 3$. In fuzzy intuitionistic sets, the uncertainty depends on the degree of membership and the degree of non-membership [29]. In neutrosophic sets, the indeterminacy factor (I) is independent of the true and false values. There are no restrictions between the degree of truth, the degree of indeterminacy, and the degree of falsehood [12, 16, 25].

If U is a universe of discourse, a Neutrosophic Set (NS) is characterized by three membership functions, $uA(x), rA(x), vA(x) : X \rightarrow \,]0-, 1+[$, which satisfy the condition $0 \leq -\inf uA(x) + \inf rA(x) + \inf vA(x) \leq \sup uA(x) + \sup rA(x) + \sup vA(x) \leq 3+$ for all $x \in X$. $uA(x), rA(x)$ and $vA(x)$ are the membership functions of the veracity, the indeterminacy, and the falsehood of x in A, respectively and their images are standard or non-standard subsets of $]0-, 1+[$.

When approaching the perspective of indeterminacy and contradiction, as is the case with Gödel's incompleteness theorem, it states that any proposition in a mathematical axiom system will present a degree of truth (T), falsehood (F), and indeterminacy (I). Neutrosophy, therefore, establishes a unique solution for the existence of paradoxes in philosophy [15].

Plithogeny is the genesis or origin, creation, formation, development, and evolution of new entities from dynamics and mergers of multiple contradictory and/or neutral and/or non-contradictory previous entities. Plithogeny advocates the connections and unification of theories and ideas in varied fields of science. We can take "knowledge" as "entities", in various fields, such as social sciences, technical sciences, theories of arts, and so on [16].

Plithogeny is the dynamics of various types of opposites, and/or their neutrals, and/or non-opposites and their organic fusion. Plithogeny is a generalization of dialectics (dynamics of a type of opposites: <A> and <antiA>), Neutrosophy (dynamics of a type of opposites and their neutrals: <A> and <antiA> and <neutA>), since Plithogeny studies the dynamics of many types of opposites and their neutrals and non-opposites (<A> and <antiA> and <neutA>, <B> and <antiB> and <neutB>, etc.), and many do not opposites (<C>, <D>, etc.) all together. As an application and particular case derived from Plithogeny, the plithogenic set is an extension of the classical set, fuzzy set, fuzzy intuitionist set, and neutrosophic set, and has multiple scientific applications [25].

So, (P,a,V,d,c) is called a plithogenic set

1. Where "P" is a set, "a" is an attribute (multidimensional in general), "V" is the range of attribute values, "d" is the degree of membership of the attribute value of each element x to the set P for some given criteria (), and "d" means "" or "" or "", when it is a fuzzy degree of membership, an intuitionistic fuzzy membership or a neutrosophic degree of membership, respectively, of an element x to the plithogenic set P; x ∈ Pd_F d_IF d_N
2. "c" means "" or "" or "", when it is a fuzzy attribute value contradiction degree function, intuitionistic fuzzy attribute value contradiction degree function, or neutrosophic attribute value degree of contradiction function, respectively. c_F c_IF c_N

The functions are defined according to the applications that the experts need to solve. $d(\cdot,\cdot)$ and $c(\cdot,\cdot)$ then, the following notation is used: $x(d(x,V)), \text{where } .\, d(x,V) = (d(x,v), \text{for every } v \in V), \forall x \in P$

The attribute value contradiction degree function is calculated between each attribute value with respect to the dominant attribute value (denoted by v_D) in particular, and also for other attribute values.

The attribute value contradiction degree function c, evaluated between the values of two attributes is used in the definition of Plithogenic aggregation operators (intersection (Y), union (OR), implication (⟹), equivalence (⟺), inclusion (partial order), and other plithogenic aggregation operators that combine two or more degrees of attribute values based on a t-norm and a t-conorm

Most plithogenic aggregation operators are linear combinations of a fuzzy t-norm (indicated by) with a fuzzy t-conorm (indicated by), but nonlinear combinations can also be constructed. ∧_F ∨_F [30]

If the t-norm is applied on the value of the dominant attribute denoted by, and the contradiction between and is, then it is applied on the value of the attribute as follows:

$$[1 - c(v_D, v_2)] \cdot t_{norm}(v_D, v_2) + c(v_D, v_2) \cdot t_{conorm}(v_D, v_2) \quad (1)$$

Or, by using symbols:

$$[1 - c(v_D, v_2)] \cdot (v_D \wedge_F v_2) + c(v_D, v_2) \cdot (v_D \vee_F v_2) \quad (2)$$

Similarly, if the t-conorm is applied on the dominant attribute value denoted by v_D, and the contradiction between v_D and v_2 is $c(v_D, v_2)$, then on the attribute value v_2 it is applied:

$$[1 - c(v_D, v_2)] \cdot t_{conorm}(v_D, v_2) + c(v_D, v_2) \cdot t_{norm}(v_D, v_2) \quad (3)$$

Or, by using symbols:

$$[1 - c(v_D, v_2)] \cdot (v_D \vee_F v_2) + c(v_D, v_2) \cdot (v_D \wedge_F v_2) \quad (4)$$

The *Plithogenic Neutrosophic Intersection* is defined as:

$$(a_1, a_2, a_3) \wedge_P (b_1, b_2, b_3) = \left(a_1 \wedge_F b_1, \frac{1}{2}[(a_2 \wedge_F b_2) + (a_2 \vee_F b_2)], a_3 \vee_F b_3\right) \quad (5)$$

The *Plithogenic Neutrosophic Union* is defined as:

$$(a_1, a_2, a_3) \vee_P (b_1, b_2, b_3) = \left(a_1 \vee_F b_1, \frac{1}{2}[(a_2 \wedge_F b_2) + (a_2 \vee_F b_2)], a_3 \wedge_F b_3\right) \quad (6)$$

In other words, if something applies to membership, the opposite applies to non-membership, while in indeterminacy the average between them is what applies.

The *Plithogenic Neutrosophic Inclusion* is defined as follows:

Since the degrees of contradiction are $c(a_1, a_2) = c(a_2, a_3) = c(b_1, b_2) = c(b_2, b_3) = 0.5$, applies: $a_2 \geq [1 - c(a_1, a_2)]b_2$ or $a_2 \geq (1 - 0.5)b_2$ or $a_2 \geq 0.5b_2$ while $c(a_1, a_3) = c(b_1, b_3) = 1$.

Having $a_1 \leq b_1$ the opposite is done for $a_3 \geq b_3$, hence $(a_1, a_2, a_3) \leq_P (b_1, b_2, b_3)$ if and only if $a_1 \leq b_1$, $a_2 \geq 0.5b_2$, and $a_3 \geq b_3$.

Next, an algorithm for the resolution of this research is presented where Plithogeny will be merged with the algorithm of Neutrosophy.

From this moment on, expressions 2 to 8 must be applied to execute the operations of the classical algorithm with plithogenic numbers.

For the elaboration of a single decision matrix, the median of the plithogenic numbers is calculated for each combination, for all specialists. The median is calculated using the following formula:

$$\text{median}_{i=1}^{m}\{PN_i\} = (\text{median}_{i=1}^{m}\{T(PN_i)\}, \text{median}_{i=1}^{m}\{I(PN_i)\}, \text{median}_{i=1}^{m}\{F(PN_i)\}) \quad (7)$$

Where PN_i, are plithogenic numbers, $T(PN\_i)$ true components, $I(PN\_i)$ indeterminate components and $F(PN_i)f$ false components. In other words, Equation 8 means that the median of a set of plithogenic numbers is defined as the plithogenic number of the medians of its components:

To compare the relationships between the quadrants, the following formula is used to blur a neutrosophic number [28]:

$$\mathcal{S}([T, I, F]) = \frac{2+T-I-F}{3} \quad (8)$$

- Determine for each line of the pairwise comparison matrix, a weighted sum based on the sum of the product of each cell by the priority of each alternative or corresponding criterion.
- For each line, divide its weighted sum by the priority of its corresponding alternative or criterion
- Determine the λmax mean of the result of the previous stage.
- Calculate the consistency index (CI) for each alternative or criterion

$$CI = \frac{\lambda_{max} - m}{m-1} \quad (9)$$

Where m is the number of alternatives

- Determine the Random Index (RI) from table 2
- Determine the consistency ratio index (the ratio between the consistency index and the random index)

3 Results

Regarding taxpayers using mobile applications and smartphones, it was found that the majority of citizens are eligible to use the application.

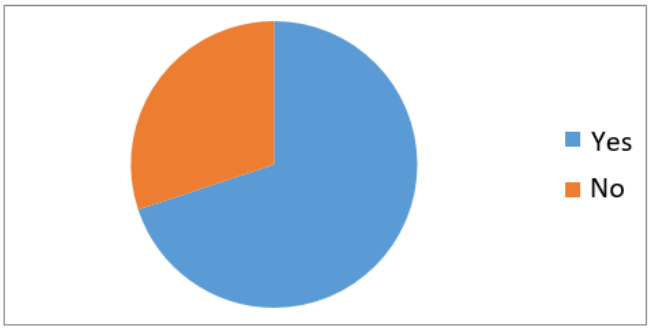

Figure 1. Statistical data. Source:[10]

In a sample before the implementation of the mobile web application, the following results were obtained:

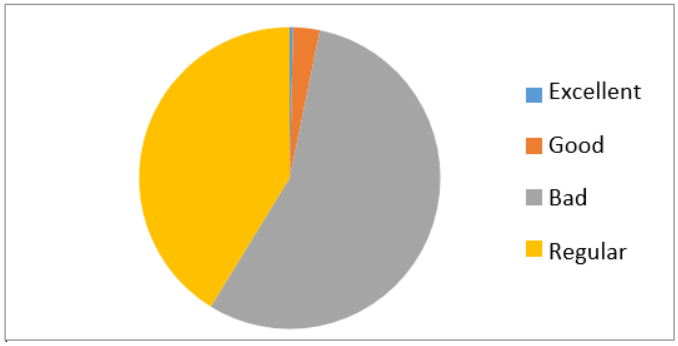

Figure 2. Customer service regarding payments. Source:[10]

Alternatives	Frequency	Percentage %
Excellent	1	0.3%
Good	8	2.7%
Bad	155	56%
Regular	115	41%
Total	279	100%

Table 1. Customer service regarding payments. Source: [10]

By the time the mobile web application was implemented, they were in confinement due to the pandemic resulting from COVID-19, for this reason, the authors think that the effectiveness rate for the use of the web and mobile payment methods developed and implemented in the DAG Municipality of San Pedro de Pelileo were accepted and recognized as a good practice in terms of management by the DAG systems personnel.

Alternatives	Frequency	Percentage %
Excellent	248	88.89%
Well	31	11.11%
Bad	0	0%
Regular	0	0%
Total	279	100%

Table 2. Implementation results. Source: [10]

4 Discussion

Authorization is the option established by the seller so that the protocol is sufficient to complete the payment; otherwise, the protocol does not achieve the payment authorization. Subsequently, the seller must perform a separate settlement function or perform further processing of this payment offline (traditional methods) [31]. The response code of the acquirer indicates if authorization is granted and, if authorization was requested, if payment was made, this can be known as double authentication methods, which could be found on credit cards or messages response before consumption (emails or SMS) as mentioned by [32].

Software development largely relates the design process to develop itself, as established in [33]. In the process, the development methodology is the fundamental part since this guides the process and the process that is established in the software operations to complete the transaction [34] [35].

The public entity presents the obligation in the delivery of the services to the taxpayer, the responsibility for guaranteeing the quality and quantity standards of the services that it offers. Public institutions are supported by legal documents which are valid to legally process the taxpayer for non-compliance with the services provided [36].

A taxpayer can pay the amounts owed on the DAG payment page, then press the Next Step button, that is, choose a payment method, on this payment method page there are 2 (two) payment methods, PayPal and credit cards, but in online payment systems is more focused on payment methods using the virtual account, when they finish choosing the taxpayers, they can press the Continue Payment button and the system sends an email to the account registered by the taxpayer as a verification payment method [10]

4.1 Development of mathematical modeling for decision making through neutrosophic logic and plithogenic logic in the digital transformation of commercialization

A plithogenic set is defined by 4 attributes, each of these attributes contains possible V values that appear between parentheses.

The attributes are described below and the possible values appear in parentheses:

V1	Market	v11	Advertising
		v12	Competitiveness
		v13	Credibility
V2	Technological means	v21	Safety
		v22	Friendly platform
V3	Variable retribution	v31	Profits
		v32	commissions
V4	Payment mode	v41	Diversity and innovation

The multi-attribute of dimension 5 has cardinality 3x2x2x1 = 12.
The degrees of contradiction between the values for each attribute are defined below:

cN (v11, v12) = cN (v11, v13) = cN (v13, v12) = 0.5
cN (v21, v22) = 0.3
cN (v31, v32) = 0.3
cN (v41, v41) = 0

As we can see, the dominant values for each attribute are: v_{13}, v_{22}, v_{31}, and v_{41}

Linguistic Expression	**Plithogenic number (T, I, F)**	$S([T,I,F]) = \frac{2+T-I-F}{3}$
Poor Importance (PI)	(0.12, 0.92, 0.97)	0.08
Less important (LI)	(0.17, 0.87, 0.92)	0.13
Low Importance (LWI)	(0.42, 0.67, 0.82)	0.31
Medium important MDI	(0.67, 0.62, 0.72)	0.44
Important (I)	(0.72, 0.37, 0.52)	0.61
More Important (MI)	(0.92, 0.27, 0.12)	0.84
Very important (VI)	(0.97, 0.07, 0.03)	0.96

Table 3. Plithogenic numbers

$$N(E) = \begin{pmatrix} \mathbf{(0,67;\,0,62;\,0,72)} & (0,42;\,0,67;\,0,82) & (0,72;\,0,37;\,0,52) & (0,17;\,0,87;\,0,92) & (0,17;\,0,87;\,0,92) & (0,42;\,0,67;\,0,82) & (0,67;\,0,62;\,0,72) & (0,72;\,0,37;\,0,52) \\ (0,97;\,0,07;\,0,03) & \mathbf{(0,67;\,0,62;\,0,72)} & (0,42;\,0,67;\,0,82) & (0,42;\,0,67;\,0,82) & (0,12,\,0,92,\,0,97) & (0,17;\,0,87;\,0,92) & (0,17;\,0,87;\,0,92) & (0,97;\,0,07;\,0,03) \\ (0,92;\,0,27;\,0,12) & (0,72;\,0,37;\,0,52) & \mathbf{(0,67;\,0,62;\,0,72)} & (0,97;\,0,07;\,0,03) & (0,12,\,0,92,\,0,97) & (0,97;\,0,07;\,0,03) & (0,72;\,0,37;\,0,52) & (0,97;\,0,07;\,0,03) \\ (0,72;\,0,37;\,0,52) & (0,92;\,0,27;\,0,12) & (0,92;\,0,27;\,0,12) & \mathbf{(0,67;\,0,62;\,0,72)} & (0,42;\,0,67;\,0,82) & (0,42;\,0,67;\,0,82) & (0,72;\,0,37;\,0,52) & (0,97;\,0,07;\,0,03) \\ (0,42;\,0,67;\,0,82) & (0,12,\,0,92,\,0,97) & (0,42;\,0,67;\,0,82) & (0,42;\,0,67;\,0,82) & \mathbf{(0,67;\,0,62;\,0,72)} & (0,42;\,0,67;\,0,82) & (0,12,\,0,92,\,0,97) & (0,42;\,0,67;\,0,82) \\ (0,12,\,0,92,\,0,97) & (0,12,\,0,92,\,0,97) & (0,17;\,0,87;\,0,92) & (0,42;\,0,67;\,0,82) & (0,42;\,0,67;\,0,82) & \mathbf{(0,67;\,0,62;\,0,72)} & (0,42;\,0,67;\,0,82) & (0,42;\,0,67;\,0,82) \\ (0,92;\,0,27;\,0,12) & (0,72;\,0,37;\,0,52) & (0,92;\,0,27;\,0,12) & (0,97;\,0,07;\,0,03) & (0,12,\,0,92,\,0,97) & (0,97;\,0,07;\,0,03) & \mathbf{(0,67;\,0,62;\,0,72)} & (0,72;\,0,37;\,0,52) \\ (0,92;\,0,27;\,0,12) & (0,97;\,0,07;\,0,03) & (0,72;\,0,37;\,0,52) & (0,92;\,0,27;\,0,12) & (0,42;\,0,67;\,0,82) & (0,42;\,0,67;\,0,82) & (0,42;\,0,67;\,0,82) & \mathbf{(0,67;\,0,62;\,0,72)} \end{pmatrix}$$

Figure 3. Neutrosophic matrix under the plithogenic logic.

$$E = \begin{pmatrix} \mathbf{0.44} & 0.31 & 0.61 & 0.13 & 0.13 & 0.31 & 0.44 & 0.61 \\ 0.96 & \mathbf{0.44} & 0.31 & 0.31 & 0.08 & 0.13 & 0.13 & 0.96 \\ 0.84 & 0.61 & \mathbf{0.44} & 0.96 & 0.08 & 0.96 & 0.61 & 0.96 \\ 0.61 & 0.84 & 0.84 & \mathbf{0.44} & 0.31 & 0.31 & 0.61 & 0.96 \\ 0.31 & 0.08 & 0.31 & 0.31 & \mathbf{0.44} & 0.31 & 0.08 & 0.31 \\ 0.08 & 0.08 & 0.13 & 0.31 & 0.31 & \mathbf{0.44} & 0.31 & 0.31 \\ 0.84 & 0.61 & 0.84 & 0.96 & 0.08 & 0.96 & \mathbf{0.44} & 0.61 \\ 0.84 & 0.96 & 0.61 & 0.84 & 0.31 & 0.31 & 0.31 & \mathbf{0.44} \end{pmatrix}$$

	td
v_{41}	1.7912
v_{13}	1.7490
v_{21}	1.6813
v_{32}	1.5146
v_{11}	1.4468
v_{12}	1.3227
v_{31}	1.0400
v_{22}	0.7124

Figure 4. De-neutrosophied adjacent matrix and the values of the extremes of the NCM under the plithogenic logic

When v_{41} is activated, all other nodes are activated too, which means that the value of Diversity and innovation in the institutions in the subset of the Mode of payment will cause a positive influence by projecting as the dominant value within the plithogenic set, so that the customer has opportunities to select the payment platform.

For the evaluation of electronic payments in governments between subsets *Payment mode* and *Market*, it is determined by the results obtained.

v41	**v13**
I (0.72, 0.37, 0.52)	**MI** (0.97, 0.07, 0.03)

Table 4. Evaluations between Payment Mode (v41) and Market (v13)

Relationship between Payment Mode (v41) and Market (v13)

Neutrosophic Plitogenic Union

$$\delta([T,I,F]) = \frac{2+T-I-F}{3}$$

$(a1, a2, a3) \vee_p (b1, b2, b3) = (a1 \wedge_D b1, \frac{1}{2}[(a2 \wedge_D b2) + (a2 \vee_D b2)], a3 \wedge_D b3)$ 0.8209

$(a1, a2, a3) \vee_p (b1, b2, b3) = (0.6984; 0.0.22; 0.0156)$

Assessment: It is on a sublevel closer to MSI than to I

The relationship of the subsets Payment mode [in its Diversity and innovation attribute (v41)] and Market [in its credibility attribute (v13)] is classified. A ranking is obtained with a degree closer to more important than important according to the plithogenic neutrosophic binding operator. Similarly, evaluations can be carried out for the rest of the subsystems, even between the different subsystems.

Conclusion

Electronic payment refers to the mode of payment that does not include physical cash or checks. Includes debit card, credit card, smart card, electronic wallet, etc. Now, Ecuadorian banking has undergone a significant transformation over time in terms of diversity and innovation. Developments in information and communication technology resulted in numerous innovations in Ecuador's payment system.

The payment systems described above offers a secure channel directly related to the transfer of credit/debit details for settlement in existing financial systems. This is also affected by transaction processing costs, ensuring that low-value transactions cannot be profitable. Recognized institutions can help in the adoption of online payment by providing a large installed base of customers.

This study has also found that these institutions play other crucial roles in online payment adoption. This results in the system gaining credibility and public awareness. Once this has been achieved, users evaluate the system based on factors such as simplicity, security, and reciprocity of benefits to stakeholders.

An electronic cash scheme, such as Visa, Mondex, and PayPal, offers the user the ability to pay to retailers and other consumers on the Internet, as well as on the high street, by phone, and at home. The payment requires no more participants than the taxpayer and the DAG, so it has no transaction processing fees and allows low-value transactions to be profitable. This uses inherent security mechanisms to ensure the security of transactions regardless of the transmission protocol used.

Electronic commerce on the Internet needs payment mechanisms that can serve as much diversity as real-world commerce. High-value transactions will require secure ways to use existing bank card mechanisms. In the end, in light of the success of the iTunes music store and the emergence of micropayments via mobile phones, it is necessary to re-examine the issue of micropayments.

The optimization capacity of neutrosophic logic was shown when integrating with plithogenic logic in decision-making. The advantages and generalization capacity of these proposals for decision-making and the management of the uncertainty generated by the systems were pointed out. It starts from the relevant characteristics of the plithogenic logic, highlights its high capacity to integrate the subsets Market, Technological means, Variable remuneration, and Mode of payment in each of its attributes.

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