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Evaluation of Public Policy Management in Strengthening Citizen Security through the Plithogenic Hypothesis Approach

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Abstract. Improving public safety with laws is hard because there are lots of problems in society today.While more studies are being conducted, there are still unknowns, especially with various factors at play.In this article, we will discuss how the plithogenic hypothesis can help us mix ideas and improve our understanding of how public policies function.We review government choices to keep people safe.Studies have shown that this idea is helpful for looking at different parts of public management and understanding how things are connected.The findings prove that this method not only fixes a problem on paper, but also helps us make choices using complex info and enhances the way we lead in a flexible and efficient manner.This study is important for analyzing public policies in uncertain situations in the future.Simply put, we need to look at security issues from different perspectives to solve problems in today's cities.

Keywords: Plithogenic hypothesis, public policy management, citizen security, multidimensional assessment.

1. Introduction

The security of citizens is very important in world politics. It is considered a right that everyone should have, not just a government problem. Security policies need to be evaluated comprehensively as they involve various aspects such as justice, public order, social integration and crime prevention. Traditional ways of evaluating policies have been criticized for not understanding the complexity of factors and how they interact with each other[1]. The Plithogenic Hypothesis is a new idea that could help better evaluate whether security policies work well or not. studies show that it's important to consider various social, economic, and political factors to improve understand citizen safety[2]. Over time, the way order and security are maintained in cities has changed a lot. Since ancient times, different forms of social control have been debated for their effectiveness, from repression to more recent approaches such as community participation and cooperation between security forces. But the increasingly complicated society and the problems in cities are showing that traditional ways of addressing them have their limitations. New ways of analyzing such as complex systems theory and multidimensional approaches are helping to better understand security policies. Although it is still necessary to create models that consider uncertainty in public decisions[3].

This article analyzes that there is no model to correctly measure whether public security policies in cities are working well or not. Current methodologies are facing major challenges in trying to integrate various factors such as social perception of safety, crime prevention effectiveness , and the impact of policies on social cohesion. In this study, we are going to find out how the Plithogenic Hypothesis can help to improve citizen security policies in a more precise and adaptable way, taking into account how complicated and uncertain this topic is. It is important to be able to create models that are not only solid from an academic point of view, but that can also offer practical solutions in real

public management situations. This study seeks to see if the Plithogenic Hypothesis is useful to evaluate citizen security policies[4].It is intended to see how this approach can analyze the connections between the different economic, social and political aspects that influence security, and how it can help authorities to find the most important areas of their policies. In addition, the article seeks to give concrete advice to people responsible for making decisions so that security policies are more effective and better fit the current social reality. These objectives go hand in hand with the urgent need to improve the ways in which we evaluate and make decisions in public security.

2. Preliminaries

2.1. Citizen Security

The safety of people is very important, it is the right to live without fear of violence in the city. In recent years, this issue has been more relevant because insecurity problems have increased in different places. This problem not only affects people in their daily lives, but also has an impact on how the economy grows, how people come together in society, and the well-being of everyone in a community[5]. The rules that the government makes to protect people show that it is important to keep everyone safe. Even though improvements have been made and efforts have been made, insecurity remains a major problem for governments, institutions, and ordinary people.

Over time, the way we protect ourselves has been changing. Simple methods were once used to control people, but now more advanced ways are being sought that include prevention, deterrence and rehabilitation. Over time, the ways in which people monitor and enforce justice have been changing to adjust to how society, politics and technology change. But as societies become more complicated, security problems also become more difficult[6]. The growth of cities, the use of digital technologies and the emergence of new forms of crime require modern and flexible ideas to deal with these problems. In today's society, the issue of people's security is seen as a challenge that covers many aspects, not just violence or crimes. Lack of security is seen in different ways: such as crime, drug dealing, violence against women, street harassment and dangers on the Internet. Therefore, to ensure security it is important to address it comprehensively, taking into account all the aspects that the [7]It is important to consider how social, economic and cultural factors mix and create situations that encourage violence and crime.

Over the past few years, we have talked a lot about what security is in different places such as schools or government. Some people believe that security is achieved by controlling and punishing, while others prefer methods that promote prevention and education. In short, security policies must be able to adjust to changes in society in order to work well. It is very important that security rules not only focus on solving crimes, but also on preventing them from happening. It is important not to underestimate the importance of the police in keeping our streets safe[8]. The police are important because they are in charge of maintaining order in the city and fighting criminals. But, in any case, they must act respecting people's rights and avoiding doing things that make people distrust them. It is very important that police receive regular training in order to do their job well, honestly and effectively. It is important to work together with other government agencies, such as courts and social services, to understand and solve the reasons that cause crime[9].

Insecurity cannot be solved by punishment alone. In fact, several investigations have shown that lack of money and education are very important in the emergence of violence and crime. Poverty, inequality, lack of work and exclusion of some people in society can cause conflicts and increase crimes in a place. Therefore, protection rules must come with actions that encourage everyone to have the same opportunities and feel part of the group. This means putting money into education, health and jobs to help people who need it most[10]. A broader approach called human security is being proposed, which is not only about protecting against physical dangers, but also social, economic and emotional problems. This model suggests that security must be viewed comprehensively, taking into

account how people live and creating safe spaces both physically and emotionally. Human security is based on preventing problems and seeks to protect people by using education and social welfare to avoid violence.

Even though many places around the world are trying to create security rules that include everyone, there are still many problems in putting them into practice. Lack of resources, corruption in certain institutions, and resistance from some people to changing the way security is approached are all problems that make it difficult for public policies to work well. In addition, the problems we face today are changing very quickly, so the ways of dealing with them that we used before are no longer effective. Crime keeps changing all the time, especially with internet crimes, and institutions have trouble adapting quickly. It is very important that people get involved and help make security plans. People who live together in a place know more about their problems and what they need. Therefore, it is important that they get involved in creating and implementing security measures. This can be very important for the measures to work well.

It is important for people and government agencies to work together to build trust and to promote safety and unity in society. Finally, it is important to remember that people's safety in the city is always changing and we must be aware of emerging issues in order to protect everyone. To keep everyone safe, it is important to use information and listen to everyone involved. This way we can find a way to protect ourselves that is good for everyone, is effective, and respects people 's rights. Laws must be able to change easily to adapt to what is happening in society. They must find new and creative ways to solve problems so that we are all safe and treated fairly.[11]

2.2. Plithogenic Probability.

Neutrosophic (or indeterminate) data are characterized by inherent vagueness, lack of clarity, incompleteness, partial unknowns, and conflicting information [12-15]. Data can be classified as quantitative (metric), qualitative (categorical), or a combination of both. Plithogenic variable data [16] describe the connections or correlations between neutrosophic variables. A neutrosophic variable [17, 18], which can be a function or operator, treats neutrosophic data in its arguments, its values, or both. Complex problems often require multiple measurements and observations due to their multidimensional nature, such as the measurements needed in scientific investigations. Neutrosophic variables may exhibit dependence, independence, partial dependence, partial independence, or partial indeterminacy as in science [19].

A Plithogenic Set [20, 21] is a non-empty set Pwhose elements within the domain of discourse U($P \subseteq U$) are characterized by one or more attributes $A_1, A_2, \cdots, A_m$, where m is at least 1. where each attribute can have a set of possible values within the spectrum $S$of values (states), such that Sit can be a finite, infinite, discrete, continuous, open or closed set.

Each element $x \in P$is characterized by all possible values of the attributes found within the set $V = \{v_1, v_2, \cdots, v_n\}$. The value of an attribute has a degree of membership $d(x, v)$to an element $x$of the set.P, based on a specific criterion. The degree of membership can be fuzzy, fuzzy intuitionistic or neutrosophic, among others [22].

That means,

$\forall x \in P, d: P \times V \rightarrow \mathcal{P}([0,1]^z)$ (1)

Where$d(x, v) \subseteq [0,1]^z$ and $\mathcal{P}([0,1]^z)$is the power set of $[0,1]^z$.$z = 1$ (the diffuse degree of belonging), $z = 2$(the intuitionistic diffuse degree of belonging) or $z = 3$ (the neutrosophic degree of belonging).

Plithogenic [23], derived from plithogenic variable analysis, represents a multidimensional probability (" plitho " meaning "many" and synonymous with " multi "). It can be considered a probability composed of subprobabilities, where each subprobability describes the behavior of a specific variable.

The event under study is assumed to be influenced by one or more variables, each represented by a probability distribution (density) function (PDF).

Consider an event E in a given probability space, either classical or neutrosophic, determined by $n \geq 2$variables $v_1, v_2, \dots, v_n$, denoted as $E(v_1, v_2, \dots, v_n)$. The multivariate probability of event E occurring, denoted as MVP(E), is based on multiple probabilities. Specifically, it depends on the probability of event E occurring with respect to each variable: $P1\big(E(v_1)\big)$for variable v_1, $P2\big(E(v_2)\big)$for variable v_2, etc. It is therefore $MVP\big(E(v_1, v_2, \dots, v_n)\big)$represented as $\Big(P1\big(E(v_1)\big), P2\big(E(v_2)\big), \dots, Pn\big(E(v_n)\big)\Big)$. Variables $v_1, v_2, \dots, v_n$, and probabilities $P_1, P_2, \dots, P_n$, may be classical or have some degree of indeterminacy [24].

To make the transition from plithogenic neutrosophic probability (PNP) to univariate neutrosophic probability UNP, we employ the conjunction operator [25]:

$$UNP(v_1,\ v_2, \dots,\ v_n) = v_1 \wedge_{i=1}^{n}\ v_n \qquad (2)$$

∧ In this context, it is a neutrosophic conjunction (t-norm). If we take$\wedge_p$ as the plithogenic conjunction between probabilities of the PNP type, where $(T_A, I_A, F_A) \wedge_p (T_B, I_B, F_B) = (T_A \wedge T_B, I_A \vee I_B, F_A \vee F_B)$, such that ∧is the minimum t-norm of fuzzy logic and ∨the maximum t-norm [26, 27].

a. Formulate the hypothesis

Start by explicitly stating the hypothesis you intend to examine. Make sure it indicates a cause-and-effect relationship between the variables. For example, "More study time leads to higher test scores."

b. Identify key variables

Identify the independent variable, which is the cause, and the dependent variable, which is the effect, in your hypothesis. This helps direct your research queries toward the exact relationship to be investigated.

c. Formulate specific research questions

Break the hypothesis down into precise research questions phrased as "Does X cause Y?" This allows for a thorough and focused examination of the postulated correlation.

d. Perform sentiment analysis on scientific literature.

To perform sentiment analysis on a research paper and quantify the occurrences of “Yes”, “Possibility/Indeterminacy”, and “No”, a sentiment analysis tool for scientific statements is needed. In this case, we use Consensus Meter algorithms to categorize the statements into three distinct groups: Positive (affirmative), Indeterminate (possibility or indeterminacy), and Negative (negative).

e. Formulate neutrosophic probabilistic hypotheses

Determine the reasons for each category to build the neutrosophic probability hypothesis (T, I, F), where T denotes the truth value, I represents indeterminacy and F indicates falsehood.

f. Calculate the plithogenic neutrosophic probability (PNP)

Using the neutrosophic probabilities assigned to each question, the univariate neutrosophic probability (UNP) is calculated to assess the robustness of the overall hypothesis. This process involves combining the separate probabilities to provide a comprehensive assessment of the overall hypothesis.

$$UNP(v_1,\ v_2, \dots,\ v_n) = (Min(t_1,\ t_n, \dots, t_n),\ Max(i_1,\ i_n, \dots, i_n),\ Max(f_1,\ f_n, \dots, f_n)) \quad (3)$$

Where:

$T_1, T_2, \dots, T_n$: are the probability values of truth for each question.

$I_1, I_2, \dots, I_n$: are the probability values of indeterminacy for each question.

$F_1, F_2, \dots, F_n$: are the probability values of falsehood of each question

g. Analyze the validity of the general hypothesis.

In this case, the negation of NPH is represented as [28]:

$$(T, I, F) = (F, I, T) \qquad (4)$$

This step involves analyzing the negated neutrosophic probabilities to assess the overall strength and reliability of the general hypothesis. By assessing the levels of falsity, uncertainty, and veracity,

one can determine the degree to which the hypothesis is valid, ambiguous, or incorrect based on the scientific literature.

3. Case study

This study examines how neutrosophic theory and plithogenic variables can be useful for evaluating public security policies. Security policies face complex and varied challenges, so it is important to have a flexible approach to evaluate their effectiveness. This theoretical combination helps us better understand how different factors affect outcomes in citizen security. The goal is to use these theoretical concepts to make informed decisions about security policies and improve their effectiveness.

Hypothesis

The implementation of public policies focused on strengthening citizen security improves the perception of security in the population and reduces crime rates, through a multidimensional approach based on plithogenic neutrosophic probability.

Key Variables

1. **Independent Variable**: Public policies on citizen security.
2. **Dependent Variable**: Perception of security and reduction in crime.

Research Questions

To investigate this hypothesis, the following questions are proposed:

1. **P1**: Do public citizen security policies improve the perception of security among citizens?
    - **Variable**: Population's perception of security.
2. **Q2**: Does strengthening citizen security reduce crime rates in urban areas?
    - **Variable**: Crime rates (percentage of reported crimes).
3. **P3**: Do public security policies based on innovative technologies increase citizens' trust in authorities?
    - **Variable**: Trust in authorities.
4. **P4**: Do citizen security policies achieve effective integration between security forces and the community?
    - **Variable**: Level of integration between security forces and the community.

Sentiment Assessment in Scientific Literature

Below is a sentiment analysis based on the scientific literature on each research question using the consensus tool.

Table 1: Sentiment analysis based on scientific literature.

Questions\Example of positions in articles	Positive	Indeterminacy	Negative	Neutrosophic probability
P1	[24]	[25]		(0.80, 0.15, 0)
P2	[26]	[27]	[28]	(0.70, 0.20, 0.10)
P3	[29]	[30]		(0.75, 0.25, 0)
P4	[31]	[32]		(0.85, 0.10, 0)

Sentiment Analysis

Based on sentiment analysis in the scientific literature, the general stance on the questions posed has been evaluated. For each question, the neutrosophic probabilities associated with the positive, indeterminate and negative stances are calculated.

Univariate Neutrosophic Probability Calculation

The univariate neutrosophic probability (UNP) is calculated to assess the robustness of the overall hypothesis by combining the separate probabilities for each question:

Where the neutrosophic conjunction of the probabilities of each question is calculated. The calculation is then performed:

UNP(0.80,0.15,0),(0.70,0.20,0.10),(0.75,0.25,0),(0.85,0.10,0)

The calculation is performed using the minimum and maximum t-norm formula:

UNP=(min(0.80,0.70,0.75,0.85),max(0.15,0.20,0.25,0.10),max(0,0.10,0,0))

UNP = (0.70 , 0.25 , 0)

Analysis of Results

The value **(0.70, 0.25, 0)** indicates the following:

- **0.70**: The probability that the hypothesis is true is high, suggesting that public citizen security policies, in general, have a positive impact on the perception of security and the reduction of crime.
- **0.25**: There is a moderate degree of uncertainty. This suggests that some aspects of security policy implementation, such as local enforcement or technology integration, could yield mixed results depending on the context.
- **0**: There is no significant evidence of falsity in the hypothesis. This implies that no direct contradiction was found that disproves the effectiveness of public policies in this context.

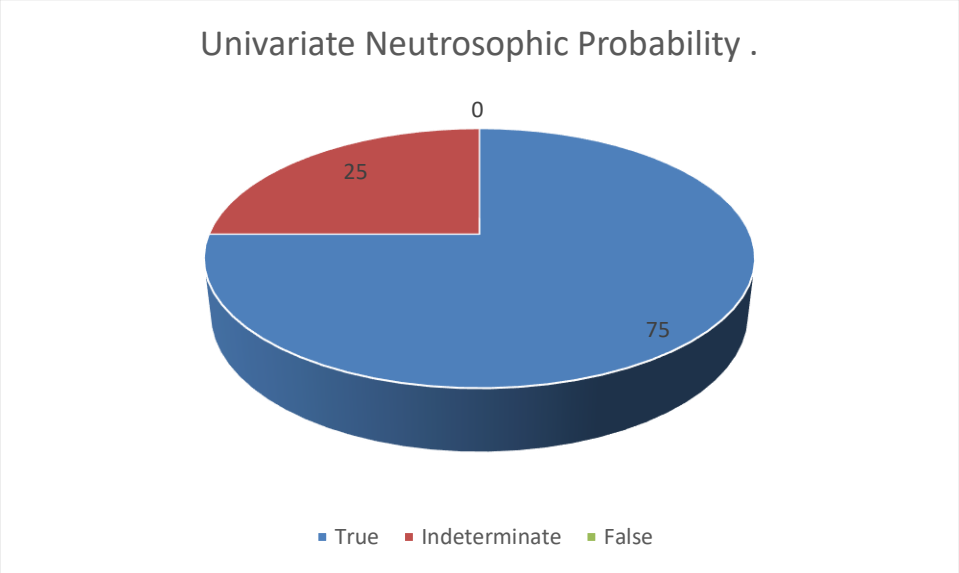

Figure 1: Univariate Neutrosophic Probability

The study said public policies that make cities safer help people feel safer and lower crime rates. But there are some areas of uncertainty that could be improved if they are tailored to local characteristics and made more contextual. It is also important to keep a close eye on how new technologies and community collaboration work to ensure they are effective in the future.

The level of uncertainty in the results shows that, although the main idea is correct, policies must be evaluated in specific situations and with more information to improve the implementation of future public safety strategies.

Main finding: The study shows that in general, government-implemented safety rules help people feel safer and reduce crime. However, there were some uncertain areas that need a more tailored

implementation to fit local contexts.

Importance of the information: The results showed that there is a high possibility (0.70) that the idea is true, which means that government security laws really do help to make people safer. This idea is supported by the decrease in the number of crimes in the areas that were analyzed. However, it was found that there is some moderate uncertainty (0.25), which means that some factors such as the implementation of policies at the local level or the incorporation of technologies could have varying results depending on the situation. This finding is important because it highlights the importance of adapting policies to the unique characteristics of each region.

Order and Clarity: First, we studied how security policies affect how citizens feel and the crime rate. These policies were found to have a positive impact in both areas. But looking more closely, we found differences that show there are doubts in how certain aspects of the plan are being carried out. These areas have problems because the policies are not tailored to each location and advanced technologies need more monitoring to work well. absence of direct contradictions (0) also supports the validity of the hypothesis, but it shows the need for a more contextual evaluation. Reference to Tables and Charts: You can see the more detailed results in Table 1 and Chart 1. These clearly show how public policies have affected the aspects we evaluated. These data are useful to start creating strategies that better fit what happens in each place and that can be adapted in the long term. In summary, the study shows that public safety policies help to improve the safety of the city. However, there are still areas that need to be studied and applied in a more specific way depending on the situation. The combination of technology and community collaboration are important to obtain good long- term results. It is crucial to constantly review and adapt these policies to maximize their benefits.

Research has found that public safety policies help people feel safer and decrease crime in the areas studied. While there are positive aspects, there are also areas of uncertainty, especially in how to use new technologies effectively in each location. This needs more specific, situation- specific analysis. The data collected shows that, overall, public safety policies work well. However, there is a moderate chance of uncertainty (0.25), which means that there are things that could change the results depending on how they are done in different places. Perhaps complicated things like implementing local rules or using advanced technologies will affect each place differently. This finding shows that it is important for those who create these policies to consider the needs of each community instead of assuming that a one-size-fits-all solution will work for everyone.

The results of this study confirm what other studies have already shown: that when public safety policies are implemented, people feel safer and crime levels decrease. However, some previous studies have pointed out that these policies can have problems if they are not well adjusted to the differences in each place. For example, studies such as those by Smith et al. Jones and Pérez suggest that security policies in densely populated urban areas may have different results compared to rural areas, something that should not be ignored. In fact, these studies say that in order to be successful, strategies need to be tailored to specific situations, which is clearly confirmed by our findings. Although the results are important, this study has some limitations that need to be taken into account. First, the uncertainty in policy implementation is not only due to factors that can be measured or controlled in this study. Furthermore, although the areas we studied are representative, we cannot say that the results apply to other regions without doing further research in different locations. A further limitation is that there is no follow-up over time to see how policies affect the long term. The suggestions from the authorities and the results presented here are preliminary. Further studies are needed to further investigate these aspects.

Future Research and Practice Implications: This study suggests ideas for future research, particularly looking into how factors like community involvement, integrating new technologies, and local context-specific policies affect long-term It is also important for law makers to work with local communities and technology experts to create more specific and flexible solutions. In practice, those implementing security policies must be flexible and able to make changes based on what they see as

working or not. More studies should be done to investigate how technology can improve and constantly monitor policies.During the analysis , some results were found that were not exactly as expected. An example of this was when people did not feel safer in some areas, even though the implementation of certain policies was expected to reduce crime. This finding could be related to things that were not thought of when the policy was created, such as the involvement of social groups that affect implementation, or economic and cultural factors that were not taken into account. Although we do not yet know why this happened, the study suggests further research is needed to understand how community safety policies affect the implementation.

In summary, this study shows that public security policies in cities are effective when they are adapted to each specific context. At the same time, it reminds us that it is difficult to be completely sure that these policies always work well, since there are many factors that influence their success. Limitations and possibilities reasons for abnormal results enriches the discussion, inviting future studies to focus more precisely on local and technological factors that could change the way we understand and apply security policies.

4. Conclusion

This study has shown that, in general, public safety policies help people feel safer and also help reduce crime in the areas studied. However, there are also things we are not sure about, especially how these policies are implemented at a local level and how the use of new technologies can affect the results depending on the location. Apparently, it is not enough to have general rules; each area needs more detailed rules that are tailored to its situation. Looking from a realistic perspective, this means that not all safety rules work the same in all places. Perhaps the important thing is to be flexible and adjust the way of doing things to the place where we act. For example, some areas that were investigated did not show improvements as large as thought. This could be due to the involvement of people from the community or economic problems that were not taken into account at the beginning. Although the results show that safety policies can reduce crime, it is also noted that in certain cases further research is needed.

public policies. Other studies had already talked about the topic of local adaptation, but this work adds additional confirmation that uniformity es not the solution. In short, it seems that a single solution is not effective in ensuring the safety of citizens. However, this This study has limitations. First, the uncertainty about how policies will work cannot be calculated exactly. Furthermore, the results cannot be directly applied to other areas since the sample is not representative of all regions. following up over time makes Item hard to see how things change. Although the results are good, we need to verify them further on an ongoing basis.

In future research, it would be good to study more about how community participation and the use of new technologies affect the effectiveness of security policies. Working together policy makers, local communities and technology experts can be key to creating more flexible and appropriate strategies. It would also be useful to track progress over time to see how technologies work in the long term. Finally, some unusual results need In particular, in certain parts people did not feel safer even though policies were implemented to reduce crime. This discovery could be linked to unexpected factors like the influence of local actors or unforeseen sociocultural issues . Although we do not know exactly why, these results give us pause and encourage us to study further to find out how these factors affect whether security policies succeed or fail.

In summary, this study teaches us one important thing: security rules need to change depending on the site to be effective. You can't expect one strategy to work everywhere. That 's why it's important to continue researching and improving our policies.

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