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Exploring the Impact of Performance Audits on the Management of Public Organizations Through the Analysis of Plithogenic Statistics

César U. Marín-Eléspuru[1], David M. Melgarejo-Mariño[2], Edgar A. Solsol-Hidalgo[3], Domingo Chiroque-Sernaqué[4] and José Ricardo Balbuena Hernández[5]

[1] National University of the Peruvian Amazon, Peru. E-mail: cesar.marin@unapiquitos.edu.pe
[2] National University of the Peruvian Amazon, Peru. E-mail: david.melgarejo@unapiquitos.gob.pe
[3] National University of the Peruvian Amazon, Peru. E-mail: edgar.solsol.044@unapiquitos.edu.pe
[4] Inca Garcilaso de la Vega University, Peru. E-mail: dchiroque@unjfsc.edu.pe
[5] National University of the Peruvian Amazon, Peru. E-mail: jose.balbuena@unapiquitos.edu.pe

Abstract. Exploring the impact of performance audits on public company management becomes a crucial field of study, highlighting how these critical assessments not only reveal operational effectiveness but also shape strategic and policy decisions. Plithogenic statistics analysis, in particular, emerges as an innovative approach that goes beyond traditional methods, introducing the inherent complexity of multiple interdependent variables and their dynamic effects on organizational outcomes. This statistical framework not only captures the inherent fluctuations in the data, but also unravels the root causes of varying performances, providing deep insights that challenge static perceptions of public administration. From a practical perspective, plithogenic analysis not only quantifies current performance, but also anticipates future trends, equipping managers with powerful tools to adjust strategies and policies more precisely. By considering the complex interaction between multiple factors, from resource management to operational efficiency, this statistical approach allows for a more holistic and nuanced assessment of the impacts of performance audits. Thus, a dynamic landscape is revealed where each piece of data reflects not only superficial results, but also the hidden connections that define the effectiveness and long-term sustainability of modern public companies.

Keywords: Public Companies, Plithogenic Probability, Plithogenic Statistics, Multivariate Statistics, Plitogenicity, Neutrosophic Number.

1 Introduction

Exploring the impact of performance audits on the administration of public companies through the analysis of plithogenic statistics represents a significant challenge and opportunity in the field of organizational management [1]. Performance audits, fundamental to evaluating the efficiency and effectiveness of government operations, not only seek to meet standards of transparency and accountability, but also play a crucial role in policy formulation and strategic decision making. In this context, the plithogenic approach emerges as an advanced methodology that allows capturing the inherent complexity of multiple variables that impact organizational performance [2].

Public companies face a dynamic and often complex environment, where operational effectiveness and efficient resource management are imperative to meet the expectations of citizens and stakeholders. Performance audits, by critically evaluating every aspect of the operation of these entities, provide a window into continuous improvement and process optimization. However, the simple act of evaluating numbers and figures is not enough; It is crucial to understand the interrelationships and synergistic effects between various areas and internal policies that affect overall performance [3]. Plithogenic analysis, by introducing a statistical framework that embraces the complexity and dynamism of interdependent variables, allows for a deeper and more precise evaluation of the impact of these audits. Rather than simply measuring performance in absolute terms, this approach examines how factors such as resource allocation, the effectiveness of regulatory policies, and organizational responsiveness interact to influence observed outcomes. This involves not only a retrospective look at the past, but also a forward-looking perspective that can inform future strategies and policy decisions [4].

Additionally, plithogenic analysis is notable for its ability to identify hidden patterns and causal relationships that may not be evident using traditional statistical analysis methods. By modeling the inherent uncertainty and variability in the data, this statistical approach offers a truer representation of the complex reality in which public

companies operate. This not only strengthens the evidence base for informed decision-making, but also provides valuable elements for the implementation of more effective and adaptive policies. In a world where the demand for transparency and efficiency in public management is growing, performance audits and plithogenic analysis emerge as indispensable tools. They not only help ensure that public resources are used effectively and efficiently, but also promote a culture of continuous improvement and accountability in government institutions. This study seeks to explore these issues from a multidimensional perspective, highlighting how the integration of advanced methodologies can transform the way performance is evaluated and managed in the public sector.

2 Related Words.

2. 1 Performance Audits.

Performance audits are a fundamental tool in business and government management, intended to evaluate the efficiency and effectiveness of the operations and policies implemented in an organization. This process is not limited to simply reviewing figures and regulatory compliance, but goes further, seeking to identify areas of improvement and opportunities to optimize resources and processes. In the business context, performance audits allow organizations to ensure that their strategies and operations are aligned with established objectives, providing a clear and objective view on the current state and future projections of the company [5]. One of the key aspects of performance audits is their ability to provide a holistic assessment of management and organizational functioning. This involves not only reviewing financial performance, but also analyzing the effectiveness of internal processes, the quality of the products or services offered, and the satisfaction of customers or users. Through this comprehensive assessment, companies can identify areas of inefficiency or risk, as well as opportunities to implement strategic changes that drive long-term competitiveness and sustainability.

In government, performance audits play a crucial role in accountability and transparency. By evaluating how public resources are used and how established objectives are met, these audits provide a solid basis for making informed and responsible policy decisions. In addition, they contribute to strengthening public trust in government institutions by demonstrating an effective commitment to efficiency and responsible management of public resources. Importantly, performance audits not only focus on the past and retrospective evaluation, but also have a prospective focus [6]. This means that not only are past results reviewed, but potential future challenges and opportunities are also anticipated. This future-oriented perspective allows organizations and government entities to better pre-pare to face changes and adapt quickly to new economic, political or social conditions.

However, performance audits face certain challenges and criticisms. Among them, the complexity in data collection and analysis, as well as the appropriate interpretation of the results obtained. Additionally, the effectiveness of audits can be compromised by factors such as resistance to organization-al change or lack of internal resources and capabilities to implement improvement recommendations. These challenges underline the importance of having appropriate methodologies and tools, as well as a strong commitment from senior management or policy makers, to ensure that performance audits are truly effective and generate added value [7].

Another crucial aspect to consider is the need to adapt performance audits to the specific characteristics of each organization or government entity. Not all companies or public institutions face the same challenges or have the same objectives, so it is essential to design personalized audits that adjust to the particular needs and realities of each case. This involves not only selecting the appropriate metrics and indicators, but also ensuring that the audit process is transparent, objective and participatory, in-volving all relevant stakeholders in the evaluation and continuous improvement process. Performance audits represent an essential tool for both private companies and government entities, providing a critical and systematic evaluation of organizational performance. Through this process, organizations can identify areas of strength and weakness, as well as opportunities to improve operational efficiency and strategic resource management [8]. However, to maximize the impact of performance audits, it is crucial to address the associated challenges and criticisms, adapting approaches and methodologies according to the specific needs of each organizational or government context. In this way, performance audits can not only fulfill their function of accountability and transparency, but al-so actively contribute to continuous improvement and the achievement of long-term organizational objectives [9].

2.2 Plithogenic Statistics.

To address the topic of Plithogenic Statistics (PS), it is crucial to understand its multidimensional nature and its application in various fields of research. Plithogenic Statistics is emerging as an innovative approach that seeks to capture the inherent complexity and interrelationships between variables in complex data sets. Unlike conventional statistical methods that focus on linearity and normality of distributions, PS incorporate the notion of plitogenicity, which reflects the diversity and interdependence between the elements analyzed [10]. In essence, PS allow us to model phenomena where the interactions between variables are significant and cannot be easily simplified into linear relationships. This approach is particularly relevant in disciplines such as evolutionary biology, complex economics, and dynamic sociology, where the systems studied exhibit nonlinear and emergent

behaviors. When considering Plithogenic Statistics, the need for analytical methods that can capture the emergence of systemic properties from the interaction between multiple factors is recognized, thus avoiding the oversimplification that limits the deep understanding of complex phenomena [11].

From a methodological perspective, Plithogenic Statistics is distinguished by its ability to handle large and heterogeneous data sets, where the relationships between variables can be non-linear and non-stationary. This involves the use of advanced techniques such as deep neural networks, complex net-work analysis and unsupervised machine learning methods [12]. The practical application of PS can transform the way we interpret and model complex systems, offering arguments that go beyond the limitations of traditional approaches based on linear models and Gaussian distributions. In the context of contemporary scientific research, Plithogenic Statistics represents a bridge between theory and observed reality, facilitating the exploration of phenomena that challenge conventional statistical simplifications. This approach allows for the capture of heterogeneity, nonlinearity, and temporal dynamics in empirical data, thereby fostering a deeper and more nuanced understanding of the complexity inherent in natural and social systems [13].

However, it is important to highlight the challenges associated with the implementation of Plithogenic Statistics. Interpretation of results can be complex due to the inherently nonlinear nature of the modeled relationships. Furthermore, the appropriate choice of techniques and validation of models require a deep understanding of the specific context of the problem under investigation, as well as careful management of biases and underlying assumptions. In terms of potential impact, PSs offer new perspectives for addressing complex problems ranging from predicting economic trends to understanding evolutionary dynamics in biological systems. By integrating plithogenic concepts into statistical practice, it opens the door to a more robust and true-to-life analysis, capable of revealing hidden patterns and subtle connections that could be overlooked with more traditional approaches [14, 15].

Plithogenic Statistics represents a significant evolution in the field of statistical analysis, promoting a more inclusive and mathematically rigorous paradigm for studying complex phenomena. As we move toward a deeper understanding of dynamic and adaptive systems, PSs offer a powerful tool to explore and model the true complexity of the natural and social world, overcoming the limitations of conventional statistical methods and opening new frontiers for research. interdisciplinary and scientific innovation.

There are several subclasses of Plithogenic Statistics which are shown[15]:

- Multivariate statistics,
- Neutrosophic Plithogenic Statistics,
- Plithogenic indeterminate statistics,
- Plithogenic intuitionistic fuzzy statistics,
- Fuzzy statistics of plithogenic images,
- Plithogenic spherical fuzzy statistics,
- and in general: Plithogenic statistics

In a neutrosophic population, each element has a triple probability of affiliation (T_j, I_j, F_j), where$T_j, I_j, F_j \in [0,1]$ similar to that $0 \leq T_j + I_j + F_j \leq 3$.

If we assume that we must have the data set $(T_j, I_j, F_j)$for $j = 1, 2, \dots, n$, where n is the sample size, then the average probability of all the sample data is calculated using Equation 1.

$$\frac{1}{n}\sum_{j=1}^{n}(T_j, I_j, F_j) = \left(\frac{\sum_{j=1}^{n} T_j}{n}, \frac{\sum_{j=1}^{n} I_j}{n}, \frac{\sum_{j=1}^{n} F_j}{n}\right) \quad (1)$$

In this investigation, we also consider some operations in the form of *neutrosophic numbers.* These ways of representing indeterminacy, under certain conditions, are equivalent to working with intervals.

Definition 1: ([16,17]) A *neutrosophic number* N is defined as a number as follows:

$$N = d + I \quad (2)$$

Where d is called *the determinate part* and I is called *the indeterminate part.*

Furthermore, the arithmetic operations between intervals are important in this paper, which are summarized below ([18,19, 20]):

Given$I_1 = [a_1, b_1]$ and$I_2 = [a_2, b_2]$ we have the following operations between them:

$I_1 \leq I_2$ If and only if$a_1 \leq a_2$ and $b_1 \leq b_2$.

$I_1 + I_2 = [a_1 + a_2, b_1 + b_2]$ (Addition) ;

$I_1 - I_2 = [a_1 - b_2, b_1 - a_2]$ (Subtraction),

$I_1 \cdot I_2 = [\min\{a_1 \cdot b_1, a_1 \cdot b_2, a_2 \cdot b_1, a_2 \cdot b_2\}, \max\{a_1 \cdot b_1, a_1 \cdot b_2, a_2 \cdot b_1, a_2 \cdot b_2\}]$ (Product),

$I_1/I_2 = I_1 \cdot (1/I_2) = \{a/b: a \in I_1, b \in I_2\}$, always that $0 \notin I_2$(Division).

3 Results and Discussion.

The research focused on a population of 200 accountants and directors of companies that were audited, as well as experienced auditors. Using non-probability sampling, it was applied at the discretion of the researcher. For data collection, the survey was used as a quantitative research method, and the data was collected using a previously prepared questionnaire. This questionnaire, developed according to the objectives and dimensions of the dependent variable, contains approximately 20 items. It was administered to both the control and experimental groups, before and after the interventions. The questionnaire was structured as follows:

1. **Efficiency (5):** This dimension focuses on evaluating how the resources available in the organization are used to achieve established objectives. Process productivity, cost optimization and the elimination of unnecessary activities that may affect overall efficiency are analyzed.
2. **Process effectiveness (5):** This dimension focuses on the ability of organizational processes to meet quality standards and achieve expected results. The quality of the final product or service delivered, customer satisfaction and alignment with regulatory and regulatory requirements is evaluated.
3. **impact (5):** This dimension evaluates how operational activities and decisions affect the organization's long-term strategic objectives. The contribution to the achievement of the organizational mission and vision is analyzed, as well as the alignment with the global strategy and the adaptability to changes in the external environment.
4. **Compliance and responsibility (5):** This dimension refers to the organization's compliance with legal, ethical and social responsibility standards. Compliance with internal and external regulations, transparency in financial and operational management, and accountability to stakeholders and the community in general are evaluated.

Auditors and economists were evaluated considering their accumulated experience, and possible limitations they might face in understanding neutrosophic methods were taken into account. Therefore, they were asked to express their opinions using ranges of values rather than assigning a single number on a continuous scale ranging from 0 (Never) to 10 (Always). Each respondent defined their intervals as $I_i = [a_i^L, a_i^U$To ensure the validity of the instruments used to collect data, validation was carried out through the judgment of experts with doctorates. The reliability of these instruments was evaluated by analyzing Cronbach's Alpha coefficient, which confirmed that the instrument used is reliable. The last step of the process involved the administration of the survey to the members of the experimental group, with the collection of all the necessary data for subsequent analysis by the researchers. The detailed steps followed in this process are as follows:

1. Different variables are specified. for the dimensions to measure:

   $S = \{s_1, s_2, \ldots, s_{34}\}$denotes the set of economics and auditors of the study group.
   $\tilde{S} = \{\tilde{s}_1, \tilde{s}_2, \ldots, \tilde{s}_{34}\}$denotes the set of economics and auditors in the control group.
   $d = \{d_1, d_2, d_3, d_4\}$denotes the set of dimensions to be measured, such that:
   d_1: Symbolizes the dimension "**Operational efficiency"**,
   d_2: Symbolizes the dimension "Process **effectiveness"**,
   d_3: Symbolizes the "Strategic **Impact"** dimension,
   d_4: Symbolizes the "Compliance **and responsibility"** dimension.
   Each of these elements is a set of elements in itself, where:

   $d_1 = \{d_{11}, d_{12}, \ldots, d_{17}\}$is the set of elements of the first dimension (d_{1j}represents the 1st item Dimension),

   $d_2 = \{d_{21}, d_{22}, \ldots, d_{26}\}$is the set of elements of the second dimension (d_{2j}represents the 2nd item Dimension),

   $d_3 = \{d_{31}, d_{32}, \ldots, d_{37}\}$is the set of elements of the third dimension (d_{3j}represents the 3rd article Dimension),

   $d_4 = \{d_{41}, d_{42}, \ldots, d_{47}\}$It is the set of elements of the fourth dimension (d_{4j}represents the 4th Article Dimension).
   In this way, the evaluations for each item are represented by:

   $I_{ij}^K = \left[a_{ij}^{KL}, a_{ij}^{KU}\right]$, which is the evaluation of the ^{ith} economic in the target group for the k th item of the j th dimension.

The equivalent notation for the control group is $\tilde{I}_{ij}^{K} = \left[\tilde{a}_{ij}^{KL}, \tilde{a}_{ij}^{KU}\right]$.

2. The dimension scores were obtained for each respondent and each of the dimensions using the following expression:

$$D_{ji} = \sum_{k=1} I_{ijk} \quad (3)$$

D_{ji} is the score of a variable or dimension j for respondent i. This score is obtained by the arithmetic sum of all the k items of the variable or dimension j, answered by respondent i, using the sum of intervals.

Equivalently, we have the results for the control group:

$$\widetilde{D}_{ji} = \sum_{k=1} \tilde{I}_{ijk} \quad (4)$$

3. Since the dimensions and variables have different numbers of elements, the scores are transformed into a range from 0 to 100 using the following expression for the study group:

$$D_{ji}^{*} = \frac{D_{ji} - \min \text{ punt theoric } D_j}{\max \text{ punt theoric } D_j - \min \text{ punt theoric } D_j} * 100 \quad (5)$$

Where: D_{ji}^{*} is the transformed score for variable or dimension j of respondent i.

In the same way, we have Equation 6 for the control group.

$$\widetilde{D}_{ji}^{*} = \frac{\widetilde{D}_{ji} - \min \text{ punt theoric } \widetilde{D}_j}{\max \text{ punt theoric } \widetilde{D}_j - \min \text{ punt theoric } \widetilde{D}_j} * 100 \quad (6)$$

These transformations allow the scores of the variables or dimensions to have the same range of values despite their number of elements so that 0 represents the minimum level and 100 the maximum level. That is, these new scores are the proportions of the dimensions or value of the variable by the respondents.

$\overline{D}_j^{*}$ denotes the average of the results for the ^{jth} dimension for the study group and is calculated by the following formula:

$$\overline{D}_j^{*} = \frac{\sum_{i=1}^{34} D_{ji}^{*}}{34} \quad (7)$$

equivalently for the control group:

$$\overline{\widetilde{D}}_j^{*} = \frac{\sum_{i=1}^{34} \widetilde{D}_{ji}^{*}}{34} \quad (8)$$

As the change occurs before and after passing the group study program, formula 9 is used:

$$\overline{\Delta}_j^{*} = \overline{D}_j^{*\text{after}} - \overline{D}_j^{*\text{before}} \quad (9)$$

Where $D_{ji\text{after}}^{*}$ denotes the scores of the study group after passing the program, while $\overline{D}_j^{*\text{before}}$ are the previous results.

While :

$$\overline{\widetilde{\Delta}}_j^{*} = \overline{D}_j^{*} - \overline{\widetilde{D}}_j^{*} \quad (10)$$

Denotes the difference between the average of the group to be studied with the control group.

Once the indices used to measure these results were defined, calculations were made that indicate the following, as can be seen in the following figures:

Figure 1 shows the percentages achieved in the interval for the **Operational Efficiency dimension**.

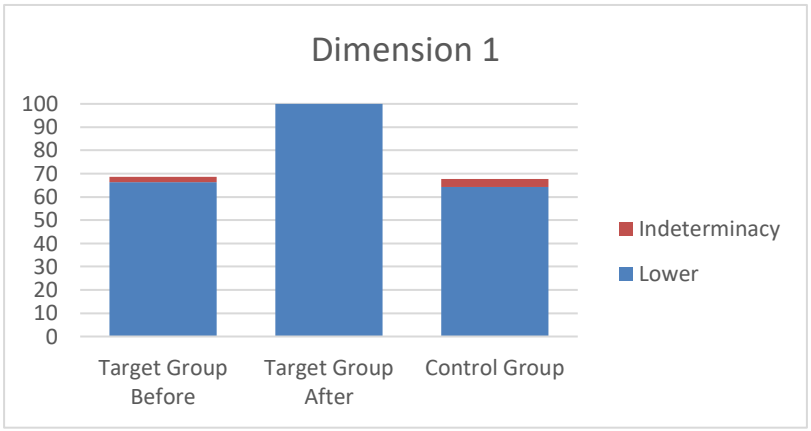

Figure 1. Results of the average of the target group before and after the performance audits and of the control group for Dimension 1. In blue is the certain percentage and in red is the indeterminate percentage.

Figure 2 is the result of Dimension "**Process effectiveness**".

Figure 2. Results of the average of the target group before and after the performance audits and of the control group for Dimension 2. In blue is the certain percentage and in red is the indeterminate percentage.

Figure 3 refers to the result of the Dimension: "**Strategic impact**".

Figure 3. Results of the average of the target group before and after the performance audits and of the control group for Dimension 3. In blue is the certain percentage and in red is the indeterminate percentage.

Figure 4 refers to the result of the Dimension: "**Compliance and responsibility**".

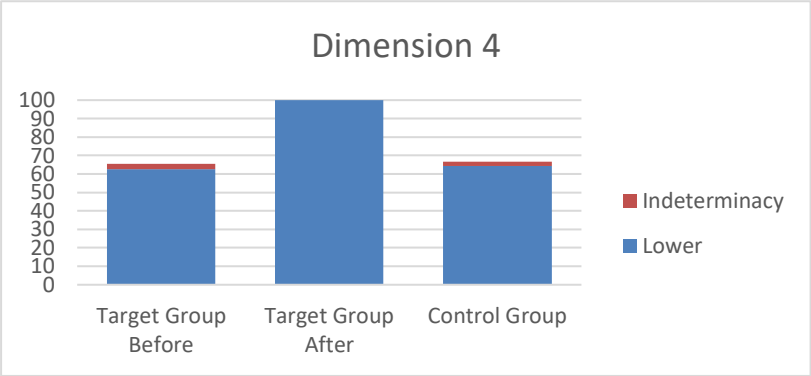

Figure 4. Results of the average of the target group before and after the performance audits and of the control group for Dimension 4. In blue is the certain percentage and in red is the indeterminate percentage.

Thus using the difference between intervals, we have:

- $\overline{\Delta}_1^* = [100,100] - [62.33,66.16] = [37.67,33.84]$,
- $\overline{\Delta}_2^* = [100,100] - [64.35,63.78] = [34.65,36.22]$,
- $\overline{\Delta}_3^* = [100,100] - [66.31,65.12] = [33.69,34.88]$,
- $\overline{\Delta}_4^* = [100,100] - [62.16,69.71] = [37.53,38.86]$.

On the other hand, the results for $\widetilde{\overline{\Delta}}_j^*$ are as shown below:

- $\widetilde{\overline{\Delta}}_1^* = [100,100] - [61.16,70.71] = [38.84,29.29]$,
- $\widetilde{\overline{\Delta}}_2^* = [100,100] - [62.34,66.35] = [37.66,33.65]$,
- $\widetilde{\overline{\Delta}}_3^* = [100,100] - [62.33,64.12] = [37.67,35.88]$,
- $\widetilde{\overline{\Delta}}_4^* = [100,100] - [67.87,63.19] = [32.13,36.81]$.

As can be seen, the values always showed improvements of around 30% or more, both when the target group was compared with itself before and after the program, and when compared with the control group.

To obtain a result that encompasses all the dimensions in a single final value, formula 11 will be used:

$$\min([a_1,b_1],[a_2,b_2]) = [\min(a_1,a_2),\min(b_1,b_2)] \quad (11)$$

In this case,

$D^* = \min([62.33,66.16],[64.35,63.78],[66.31,65.12],[62.16,69.71]) = [62.16,63.78]$ It is the result of the target group before the educational reforms.

After passing the performance audits the overall result is [100,100]. For the control group this is $\widetilde{D}^* = \min([61.16,70.71],[62.34,66.35],[62.33,64.12],[67.87,63.19]) = [61.16,63.19]$

Finally, we obtained the result for the test of "the quality of management of public organizations", be-fore and after for the objective group and the control group. These are shown in Figure 5:

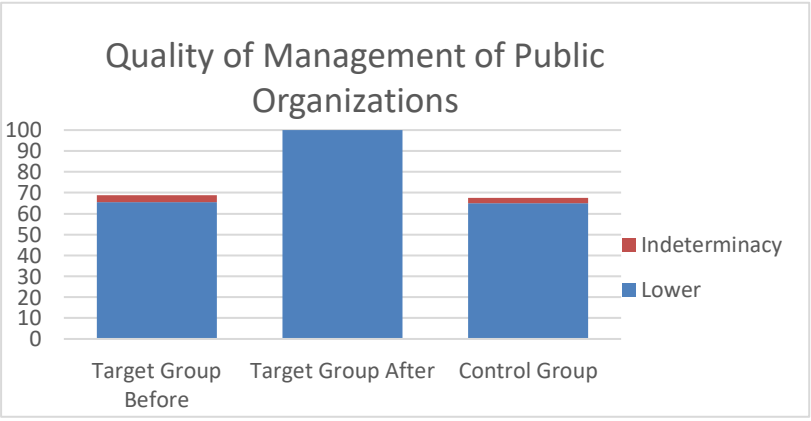

Figure 5. Average results of the target group before and after performance audits and of the control group for "the quality of management of public organizations". in blue is the certain percentage and in red is the indeterminate percentage.

In this case, we will calculate the difference in absolute value to avoid negative numbers in the calculation of the relationship between performance audits and the quality of management of public organizations. That is, equation 12 will be used.

$$[a_1, b_1] \ominus [a_2, b_2] = [\text{abs}(a_1 - b_2), \text{abs}(b_1 - a_2)] \quad (12)$$

In this case, it is:

$[62.16,63.78] \ominus [61.16,63.19] = [1.03, 2.62]$ which is the result of comparing "the quality of management of public organizations" with the aggregation of the four dimensions that represent "performance audits." This represents a difference of less than 5. 5% between both results.

On the other hand, $[100, 100] \ominus [100, 100] = [0, 0]$ for both variables after the program. This suggests a high and positive correlation between "performance audits" and "the quality of management of public organizations."

To address the evaluation of performance audits and their impact on the management of public organizations, it is essential to understand the critical dimensions involved in this process. Performance audits are structured around four fundamental dimensions: operational efficiency, process effective-ness, strategic impact, and compliance and accountability. Each of these dimensions plays a crucial role in the comprehensive evaluation of how resources are used, quality standards are achieved, strategic objectives are contributed, and legal and ethical regulations are met within a public organization. Operational efficiency, the first dimension considered, focuses on productivity and optimization of resources to achieve established objectives. It is essential to evaluate the elimination of redundant activities that may negatively affect the overall efficiency of the organization. This dimension not only seeks to reduce unnecessary costs, but also improve the effective use of available resources.

On the other hand, process effectiveness addresses the ability of organizational processes to meet quality standards and deliver satisfactory results. Here the quality of the final product or service is evaluated, as well as customer satisfaction and alignment with current regulations. This dimension is crucial to ensure that internal processes are aligned with the organization's strategic objectives and can adapt to changes in the external environment. Strategic impact, the third aspect evaluated, analyzes how operational decisions and actions affect the organization's long-term objectives. This involves evaluating the contribution to the achievement of the organizational mission and vision, as well as the ability to adapt to significant changes in the market or in the political and social context. Proper strategic alignment ensures that the organization can maintain its relevance and competitiveness in the long term.

Finally, compliance and responsibility refer to rigorous adherence to legal, ethical and social responsibility regulations. Transparency in financial and operational management is evaluated, as well as accountability to stakeholders and the community in general. This dimension not only ensures compliance with regulations, but also strengthens public trust in government management and promotes institutional integrity. In the context of the neutrosophic evaluation carried out, the management quality of public organizations was compared with the aggregation of these fourperformance audit dimensions. The results showed a minimum difference, less than 5. 5%, which suggests a significant and positive correlation between the effective implementation of performance audits and the improvement in the quality of management of public entities. This finding highlights the importance of using comprehensive and multidimensional approaches such as performance audits to improve efficiency, strategic effectiveness and regulatory compliance in the public sector.

Furthermore, a perfect correlation was observed between performance audits and management quality, indicating high consistency between the implementation of audit practices and the level of performance achieved by public organizations. This result reinforces the idea that performance audits are not only retrospective evaluation tools, but also strategic instruments to guide decision making and continually improve public management. However, it is crucial to recognize that the effective implementation of performance audits faces significant challenges, such as the need for adequate resources and specialized staff training. These obstacles can limit the ability of organizations to obtain full benefits from these evaluation practices. It is therefore imperative to invest in training and capacity development, as well as strengthening data infrastructures and information systems that support the effective implementation of performance audits. In conclusion, performance audits represent an essential tool to evaluate and improve the management of public organizations through key dimensions such as operational efficiency, process effectiveness, strategic impact and compliance and responsibility. The neutrosophic results obtained highlight a strong correlation between the effective implementation of these audits and the quality of public management, underlining the importance of adopting integrated and systematic approaches to strengthen governance and transparency in the public sector [21,22].

4 Conclusion

Audits are structured into four fundamental dimensions: operational efficiency, process effectiveness, strategic impact and compliance and responsibility. Each of these dimensions plays a crucial role in the comprehensive evaluation of how available resources are used, quality standards are achieved, strategic objectives are contributed to, and compliance with legal and ethical regulations is ensured within a public organization. Operational efficiency, as the first dimension, focuses on improving productivity and optimizing the use of resources to achieve organizational goals. This includes eliminating redundant activities that could negatively impact overall efficiency. It is not just about reducing costs, but about maximizing the effectiveness of available resources to improve the overall performance of the entity. On the other hand, process effectiveness evaluates the ability of organizational processes to meet quality standards and achieve satisfactory results. The quality of the final product or service delivered, customer satisfaction and alignment with current regulations is analyzed. It is essential that internal processes are strategically aligned and flexible enough to adapt to external changes.

Strategic impact, as a third crucial aspect, studies how operational decisions affect the organization's long-term objectives. This involves evaluating the contribution to the achievement of the organizational mission and vision, as well as the ability to adapt to significant changes in the political, social and economic environment. Effective strategic alignment ensures the organization's continued relevance and competitiveness in a dynamic environment. Finally, compliance and responsibility focus on rigorously adhering to legal regulations, ethics, and social responsibilities. This includes transparency in financial and operational management, as well as accountability to stakeholders and the community in general. Strengthening this dimension not only guarantees regulatory compliance, but also reinforces public trust in government administration and promotes institutional integrity. In the neutrosophic evaluation carried out, quality management in public organizations was compared with the integration of these four performance audit dimensions. The results showed a minimal difference, less than 5. 5%, indicating a positive and significant correlation between the effective implementation of performance audits and improvement in the management of public entities. This finding under-scores the importance of adopting comprehensive and multidimensional approaches such as performance audits to improve operational efficiency, strategic effectiveness and regulatory compliance in the public sector.

Furthermore, a perfect correlation was observed between performance audits and management quality, which reflects a high consistency between the implementation of audit practices and the level of performance achieved by public organizations. This result reinforces the idea that performance audits are not only retrospective evaluation tools, but also strategic instruments to guide decision-making and continually improve public management. However, it is crucial to recognize that effective implementation of performance audits faces significant challenges, such as appropriate resource allocation and specialized staff training. These obstacles can limit organizations' ability to take full advantage of these evaluation practices. Therefore, it is imperative to invest in training and capacity development, as well as strengthening data infrastructures and information systems that support effective implementation of performance audits. In conclusion, performance audits represent an essential tool to evaluate and improve the management of public organizations through key dimensions such as operational efficiency, process effectiveness, strategic impact and compliance and responsibility. The neutrosophic results obtained highlight a strong correlation between the effective implementation of these audits and the quality of public management, underscoring the importance of adopting comprehensive and systematic approaches to strengthen governance and transparency in the public sector.

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