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Probabilistic Interval Neutrosophic Hesitant Fuzzy Set for Strategic Estimation of Communication Instruction and Critical Analysis of Journalism Teaching Practices in Higher Education

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Abstract: Journalism and communication education must adjust to both changing public expectations and technology breakthroughs in the quickly changing media and information ecosystem. This study provides a methodical approach for evaluating the efficacy of instructional strategies in journalism programs at higher education institutions. The study uses multi-criteria decision-making (MCDM) methodologies to identify important criteria and options that are necessary to develop skilled, moral, and flexible communication professionals. We use the CoCoSo method to rank the alternatives. This methodology is used under the Probabilistic Interval Neutrosophic Hesitant Fuzzy Set to overcome uncertainty and vague information. The framework emphasizes the necessity of striking a balance between practical industrial skills and academic foundations. The evaluation's results give institutions a road map for improving their pedagogical approaches, curriculum, and instructional strategies to better meet the needs of the real world. The purpose of this article is to provide educators, curriculum designers, and policymakers with practical ideas to improve the caliber of journalism education.

Keywords: Probabilistic Interval Neutrosophic Hesitant Fuzzy Set; Communication Instruction; Analysis of Journalism; Teaching.

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1. Introduction

The emergence of digital technology and the dispersion of media consumers have caused a paradigm change in the fields of journalism and communication throughout the past 20 years. Universities are therefore under more pressure than ever to modify their instructional strategies to get students ready for a dynamic, fast-paced workplace[1], [2]. The desire for multidisciplinary, technology-driven, and experiential approaches is posing a challenge to traditional lecture-based instruction. Students today require proficiency with digital technologies, data literacy, audience engagement techniques, and excellent writing and analytical abilities[3], [4].

Considering this, it is imperative to create a methodical and strategic framework for assessing the efficacy of journalism and communication program instruction. Both qualitative and quantitative measurements that capture the nuanced reality of contemporary media should be included in such a framework[5], [6].

A multi-criteria decision-making (MCDM) approach is used in this study to assess instructional strategies along several fundamental parameters. The complex interplay of factors including creativity, ethics, technical proficiency, and critical thinking in communication education may be captured by MCDM.

Feedback from stakeholders, such as academic reviewers, media professionals, instructors, and students, is incorporated into the evaluation. It is intended to be flexible and dynamic, reflecting both new developments in journalism practice and existing academic norms[7], [8].

Eight important criteria are used to assess ten various teaching approaches. From traditional lecture forms to AI-integrated and simulation-based learning, each model reflects a unique educational approach. This diversity guarantees a comprehensive comprehension of what functions and why in various educational settings[9], [10].

The goal of this research is to provide precise, useful information for enhancing university-level journalism and communication education. For academic programs to be current and successful, it also emphasizes the necessity of ongoing feedback and iterative improvement.

The following succinctly describes the novelties and contributions of this work:

A decision matrix was developed for this study using the development criteria and the intersection models.

To establish the weight and level of significance of the development criterion, this study proposes and formulates the CoCoSo technique.

This study tackles several criteria and data variation issues by combining the CoCoSo technique with the created Probabilistic interval neutrosophic hesitant fuzzy set approach.

This work used integrated methodologies and the created decision matrix to produce a unique decision modeling strategy for the MCDM methods.

We use the Probabilistic interval neutrosophic hesitant fuzzy set to overcome uncertainty and value information.

1.1 Multiple criteria decision-making (MCDM)

Multiple criteria decision-making (MCDM) techniques help solve real-world issues and lay the groundwork for future decisions[11], [12]. The three steps of MCDM are as follows:

(1) identifying criteria and alternatives.

(2) converting criteria and alternative importance into numerical measures.

(3) processing these numerical measures to model and prioritize alternatives.

Despite several notable quirks, MCDM theory has been proven to be useful for decision-making. It is separated into two methods, one human and one mathematical. The human method offers criterion weighting, while the mathematical method ranks the alternatives. The next subsections examine the benefits and drawbacks of the popular MCDM techniques[13], [14].

Real-world decision-making situations frequently involve uncertainty, and fuzzy set theory has been proposed as a mathematical model to deal with this problem. There are also several alternative fuzzy-set theories. Fuzzy set theory and probability theory have been combined, and statistical uncertainty is a key factor in real-world applications. Numerous strategies have been developed to deal with fuzzy decision-making issues, such as representing information using probability theory and producing fuzzy values by combining nonlinear programming with stochastic simulations. Numerous techniques, such as probabilistic fuzzy linguistic word sets, hesitant probabilistic fuzzy sets, and probabilistic dual-hesitant fuzzy sets, have been developed to solve uncertain risk-evaluation problems[15], [16].

Neutrosophic sets have also been introduced as new types, including truth, indeterminacy, and falsity membership. New kinds of neutrosophic sets have been created because of the thorough study and application of the idea of neutrosophic fuzzy sets. Additionally, to solve multi-criteria collaborative decision-making problems without information loss, the theory of probability multivalued neutrosophic sets was developed[17], [18]. To solve MCDM issues in probabilistic interval neutrosophic hesitant fuzzy set (PINHFS), probabilistic principles are finally presented. Therefore, creating CoCoSo with PINHFS was the driving force for this project.

As far as we are aware, no case study has made use of the integration of the PINHFS, CoCoSo, and approach. To solve the MCDM issue, we are therefore prompted to combine the suggested PINHFS–CoCoSo approach. The innovative PINHFS–CoCoSo approach can handle informational ambiguity and uncertainty and rank the creation of criteria.

1.2 The main contributions of this study are:

- We develop a MCDM model for Strategic Evaluation of Communication Instruction and Critical Analysis of Journalism Teaching Practices in Higher Education.
- We use PINHFS to overcome uncertainty information in the decision-making process while evaluating.
- The CoCoSo method is an MCDM method used in this study to rank the alternatives using the decision matrix.

- Set of criteria and alternatives are used to select the best criterion by the weights and the best alternatives using the ranking.

1.3 The rest of this paper

The rest of this paper is organized as follows: Section 2 shows the Probabilistic interval neutrosophic hesitant fuzzy set definitions and operations. Section 3 shows the Experimental results of the proposed approach by showing the criteria weights and ranking the alternatives. Section 4 shows the analysis of the results pf this paper. Section 5 shows the conclusion of this paper.

2. Probabilistic interval neutrosophic hesitant fuzzy set (PINHFS)

We show operations and definitions of the PINHFS. We use PINHFS for creating the decision matrix between the criteria and alternatives[19], [20].

$$X = \{< x, M(x)|P^M(x), I(x)|P^I(x), N(x)|P^N(x) >\} \quad (1)$$

There are three potential elements such as $M(x)|\, P^M(x), I(x)|P^I(x), and\ N(x)|\, P^N(x)$.

The $a \in M(x), b \in I(x), and\ c \in N(x)$ (2)

$$a = [a^L, a^U] \quad (3)$$

$$b = [b^L, b^U] \quad (4)$$

$$c = [c^L, c^U] \quad (5)$$

$$0 \le \sup\left(\cup_{a\in M(x)} a^U\right) + \sup\left(\cup_{b\in I(x)} b^U\right) + \sup\left(\cup_{c\in N(x)} c^U\right) \le 3 \quad (6)$$

$$\sum_{a\in M} P_a = 1, \sum_{b\in N} P_b = 1, and \sum_{a\in N} P_c = 1 \quad (7)$$

The score function of PINHFS

$$S(x) = \frac{1}{6}\left(\sum_{a\in M}(a^L + a^U)P_a + \sum_{b\in I}(b^L + b^U)P_b + \sum_{c\in N}(c^L + c^U)P_c\right) \quad (8)$$

PINHFS weighted average operator is presented as:

$$\text{PINHFSWA}(h_1, h_2, \dots, h_m) = {}_{i=1}^{m}\oplus w_i h_i \quad (9)$$

$$= \begin{pmatrix} \cup_{a_i\in M_i}\left\{\left[1 - \prod_{i=1}^{m}\left(1 - a_i^L\right)^{w_i}, 1 - \prod_{i=1}^{m}\left(1 - a_i^U\right)^{w_i},\right] | \prod_{i=1}^{m} P_{ai}\right\}, \\ \cup_{b_i\in I_i}\left\{\left[\prod_{i=1}^{m}\left(b_i^L\right)^{w_i}, \prod_{i=1}^{m}\left(b_i^U\right)^{w_i},\right] | \prod_{i=1}^{m} P_{bi}\right\}, \\ \cup_{c_i\in N_i}\left\{\left[\prod_{i=1}^{m}\left(c_i^L\right)^{w_i}, \prod_{i=1}^{m}\left(c_i^U\right)^{w_i},\right] | \prod_{i=1}^{m} P_{c_i}\right\} \end{pmatrix} \quad (10)$$

We show the steps of the CoCoSo method to rank the alternatives under the PINHFS. We use the PINHFS to overcome uncertainty and vague information.

Create the decision matrix

$$y_{ij} = \begin{bmatrix} y_{11} & \cdots & y_{1n} \\ \vdots & \ddots & \vdots \\ y_{m1} & \cdots & y_{mn} \end{bmatrix}; i = 1, \dots, m; j = 1, \dots, n \tag{11}$$

Compute the normalized decision matrix. The decision matrix is normalized for positive and cost criteria such as:

$$u_{ij} = \frac{y_{ij} - \min_i y_{ij}}{\max_i y_{ij} - \min_i y_{ij}} \tag{12}$$

$$u_{ij} = \frac{\max_i y_{ij} - y_{ij}}{\max_i y_{ij} - \min_i y_{ij}} \tag{13}$$

The power weighted decision matrix is computed

$$A_i = \sum_{j=1}^{n} w_j u_{ij} \tag{14}$$

The total weighted decision matrix is computed

$$B_i = \sum_{j=1}^{n} \left(u_{ij}\right)^{w_j} \tag{15}$$

The three strategies are used to compute the relative weight of every alternative.

$$Q_{ia} = \frac{A_i + B_i}{\sum_{i=1}^{m}(A_i + B_i)} \tag{16}$$

$$Q_{ib} = \frac{A_i}{\min_i A_i} + \frac{B_i}{\min_i B_i} \tag{17}$$

$$Q_{ic} = \frac{\varphi(A_i) + (1-\varphi)(B_i)}{\left(\varphi \max_i A_i + (1-\varphi) \max_i B_i\right)} \quad 0 \le \varphi \le 1 \tag{18}$$

Obtain the final value of each alternative.

$$Q_i = (Q_{ia} Q_{ib} Q_{ic})^{\frac{1}{3}} + \frac{1}{3}(Q_{ia} + Q_{ib} + Q_{ic}) \tag{19}$$

Rank the alternatives.

3. Experimental results

The results of the proposed methodology to solve the MCDM approach are shown in this section to show the criteria weights and ranking the alternatives.

3.1 Decision matrix and evaluation method results

The lists of MCDM modules of the techniques and their development criteria were crossed to create the choice matrix. The MCDM modules of the are shown in Table 8, and the suggested choice matrix for MCDM modules is reported in Tables 1–3. The evaluation criteria are shown as: Curriculum Pertinence, Including Digital Tools, Research and Reporting Skills, Critical Development, Thinking Industry Engagement, Proficiency in Multimedia and Storytelling, Mechanisms for Ethical, Legal Instruction Evaluation and Feedback. The alternatives are: Traditional Lecture-Based Approach, Case-Based Learning with Newsroom Simulations, Data Journalism and Analytics Integration, AI-Assisted Writing and Multimedia Content Production, Peer Collaboration and Constructivist Learning, Hybrid Model with Online-Offline Blended Instruction, Inquiry-Based Learning with Investigative Projects, Ethics-Driven Curriculum with Scenario-Based Decision Making, Podcasting and Video Journalism Labs, Field Reporting and Immersive Experience-Based Instruction.

Table 1. The first PINHFS.

	C_1	C_2	C_3	C_4
A1	([0.75,0.8],0.7[0.7,0.75,]0.3,[0.2,0.25],0.7,[0.25,0.3],0.3,[0.2,0.25],0.7,[0.25,0.3],0.3)	([0.55,0.6],0.5[0.5,0.55,]0.5,[0.4,0.45],0.5,[0.45,0.5],0.5,[0.4,0.45],0.5,[0.45,0.5],0.5)	([0.35,0.4],0.7[0.25,0.35,]0.3,[0.6,0.65],0.7,[0.65,0.75],0.3,[0.6,0.65],0.7,[0.65,0.75],0.3)	([0.15,0.2],0.8[0.1,0.15,]0.2,[0.8,0.85],0.8,[0.85,0.9],0.2,[0.8,0.85],0.8,[0.85,0.9],0.2)
A2	([0.75,0.8],0.7[0.7,0.75,]0.3,[0.2,0.25],0.7,[0.25,0.3],0.3,[0.2,0.25],0.7,[0.25,0.3],0.3)	([0.15,0.2],0.8[0.1,0.15,]0.2,[0.8,0.85],0.8,[0.85,0.9],0.2,[0.8,0.85],0.8,[0.85,0.9],0.2)	([0.75,0.8],0.7[0.7,0.75,]0.3,[0.2,0.25],0.7,[0.25,0.3],0.3,[0.2,0.25],0.7,[0.25,0.3],0.3)	([0.55,0.6],0.5[0.5,0.55,]0.5,[0.4,0.45],0.5,[0.45,0.5],0.5,[0.4,0.45],0.5,[0.45,0.5],0.5)
A3	([0.95,1],0.8[0.9,0.95,]0.2,[0,0.05],0.8,[0.05,0.1],0.2,[0,0.05],0.8,[0.05,0.1],0.2)	([0.35,0.4],0.7[0.25,0.35,]0.3,[0.6,0.65],0.7,[0.65,0.75],0.3,[0.6,0.65],0.7,[0.65,0.75],0.3)	([0.35,0.4],0.7[0.25,0.35,]0.3,[0.6,0.65],0.7,[0.65,0.75],0.3,[0.6,0.65],0.7,[0.65,0.75],0.3)	([0.15,0.2],0.8[0.1,0.15,]0.2,[0.8,0.85],0.8,[0.85,0.9],0.2,[0.8,0.85],0.8,[0.85,0.9],0.2)
A4	([0.15,0.2],0.8[0.1,0.15,]0.2,[0.8,0.85],0.8,[0.85,0.9],0.2,[0.8,0.85],0.8,[0.85,0.9],0.2)	([0.55,0.6],0.5[0.5,0.55,]0.5,[0.4,0.45],0.5,[0.45,0.5],0.5,[0.4,0.45],0.5,[0.45,0.5],0.5)	([0.15,0.2],0.8[0.1,0.15,]0.2,[0.8,0.85],0.8,[0.85,0.9],0.2,[0.8,0.85],0.8,[0.85,0.9],0.2)	([0.75,0.8],0.7[0.7,0.75,]0.3,[0.2,0.25],0.7,[0.25,0.3],0.3,[0.2,0.25],0.7,[0.25,0.3],0.3)
A5	([0.35,0.4],0.7[0.25,0.35,]0.3,[0.6,0.65],0.7,[0.65,0.75],0.3,[0.6,0.65],0.7,[0.65,0.75],0.3)	([0.75,0.8],0.7[0.7,0.75,]0.3,[0.2,0.25],0.7,[0.25,0.3],0.3,[0.2,0.25],0.7,[0.25,0.3],0.3)	([0.35,0.4],0.7[0.25,0.35,]0.3,[0.6,0.65],0.7,[0.65,0.75],0.3,[0.6,0.65],0.7,[0.65,0.75],0.3)	([0.15,0.2],0.8[0.1,0.15,]0.2,[0.8,0.85],0.8,[0.85,0.9],0.2,[0.8,0.85],0.8,[0.85,0.9],0.2)
A6	([0.55,0.6],0.5[0.5,0.55,]0.5,[0.4,0.45],0.5,[0.45,0.5],0.5,[0.4,0.45],0.5,[0.45,0.5],0.5)	([0.15,0.2],0.8[0.1,0.15,]0.2,[0.8,0.85],0.8,[0.85,0.9],0.2,[0.8,0.85],0.8,[0.85,0.9],0.2)	([0.55,0.6],0.5[0.5,0.55,]0.5,[0.4,0.45],0.5,[0.45,0.5],0.5,[0.4,0.45],0.5,[0.45,0.5],0.5)	([0.35,0.4],0.7[0.25,0.35,]0.3,[0.6,0.65],0.7,[0.65,0.75],0.3,[0.6,0.65],0.7,[0.65,0.75],0.3)
A7	([0.75,0.8],0.7[0.7,0.75,]0.3,[0.2,0.25],0.7,[0.25,0.3],0.3,[0.2,0.25],0.7,[0.25,0.3],0.3)	([0.35,0.4],0.7[0.25,0.35,]0.3,[0.6,0.65],0.7,[0.65,0.75],0.3,[0.6,0.65],0.7,[0.65,0.75],0.3)	([0.75,0.8],0.7[0.7,0.75,]0.3,[0.2,0.25],0.7,[0.25,0.3],0.3,[0.2,0.25],0.7,[0.25,0.3],0.3)	([0.55,0.6],0.5[0.5,0.55,]0.5,[0.4,0.45],0.5,[0.45,0.5],0.5,[0.4,0.45],0.5,[0.45,0.5],0.5)
A8	([0.95,1],0.8[0.9,0.95,]0.2,[0,0.05],0.8,[0.05,0.1],0.2,[0,0.05],0.8,[0.05,0.1],0.2)	([0.55,0.6],0.5[0.5,0.55,]0.5,[0.4,0.45],0.5,[0.45,0.5],0.5,[0.4,0.45],0.5,[0.45,0.5],0.5)	([0.95,1],0.8[0.9,0.95,]0.2,[0,0.05],0.8,[0.05,0.1],0.2,[0,0.05],0.8,[0.05,0.1],0.2)	([0.75,0.8],0.7[0.7,0.75,]0.3,[0.2,0.25],0.7,[0.25,0.3],0.3,[0.2,0.25],0.7,[0.25,0.3],0.3)
A9	([0.75,0.8],0.7[0.7,0.75,]0.3,[0.2,0.25],0.7,[0.25,0.3],0.3,[0.2,0.25],0.7,[0.25,0.3],0.3)	([0.75,0.8],0.7[0.7,0.75,]0.3,[0.2,0.25],0.7,[0.25,0.3],0.3,[0.2,0.25],0.7,[0.25,0.3],0.3)	([0.75,0.8],0.7[0.7,0.75,]0.3,[0.2,0.25],0.7,[0.25,0.3],0.3,[0.2,0.25],0.7,[0.25,0.3],0.3)	([0.75,0.8],0.7[0.7,0.75,]0.3,[0.2,0.25],0.7,[0.25,0.3],0.3,[0.2,0.25],0.7,[0.25,0.3],0.3)
A10	([0.95,1],0.8[0.9,0.95,]0.2,[0,0.05],0.8,[0.05,0.1],0.2,[0,0.05],0.8,[0.05,0.1],0.2)	([0.15,0.2],0.8[0.1,0.15,]0.2,[0.8,0.85],0.8,[0.85,0.9],0.2,[0.8,0.85],0.8,[0.85,0.9],0.2)	([0.35,0.4],0.7[0.25,0.35,]0.3,[0.6,0.65],0.7,[0.65,0.75],0.3,[0.6,0.65],0.7,[0.65,0.75],0.3)	([0.55,0.6],0.5[0.5,0.55,]0.5,[0.4,0.45],0.5,[0.45,0.5],0.5,[0.4,0.45],0.5,[0.45,0.5],0.5)

	C_5	C_6	C_7	C_8
A1	([0.15,0.2],0.8[0.1,0.15,]0.2,[0.8,0.85],0.8,[0.85,0.9],0.2,[0.8,0.85],0.8,[0.85,0.9],0.2)	([0.75,0.8],0.7[0.7,0.75,]0.3,[0.2,0.25],0.7,[0.25,0.3],0.3,[0.2,0.25],0.7,[0.25,0.3],0.3)	([0.95,1],0.8[0.9,0.95,]0.2,[0,0.05],0.8,[0.05,0.1],0.2,[0,0.05],0.8,[0.05,0.1],0.2)	([0.95,1],0.8[0.9,0.95,]0.2,[0,0.05],0.8,[0.05,0.1],0.2,[0,0.05],0.8,[0.05,0.1],0.2)
A2	([0.35,0.4],0.7[0.25,0.35,]0.3,[0.6,0.65],0.7,[0.65,0.75],0.3,[0.6,0.65],0.7,[0.65,0.75],0.3)	([0.15,0.2],0.8[0.1,0.15,]0.2,[0.8,0.85],0.8,[0.85,0.9],0.2,[0.8,0.85],0.8,[0.85,0.9],0.2)	([0.15,0.2],0.8[0.1,0.15,]0.2,[0.8,0.85],0.8,[0.85,0.9],0.2,[0.8,0.85],0.8,[0.85,0.9],0.2)	([0.75,0.8],0.7[0.7,0.75,]0.3,[0.2,0.25],0.7,[0.25,0.3],0.3,[0.2,0.25],0.7,[0.25,0.3],0.3)
A3	([0.55,0.6],0.5[0.5,0.55,]0.5,[0.4,0.45],0.5,[0.45,0.5],0.5,[0.4,0.45],0.5,[0.45,0.5],0.5)	([0.35,0.4],0.7[0.25,0.35,]0.3,[0.6,0.65],0.7,[0.65,0.75],0.3,[0.6,0.65],0.7,[0.65,0.75],0.3)	([0.35,0.4],0.7[0.25,0.35,]0.3,[0.6,0.65],0.7,[0.65,0.75],0.3,[0.6,0.65],0.7,[0.65,0.75],0.3)	([0.95,1],0.8[0.9,0.95,]0.2,[0,0.05],0.8,[0.05,0.1],0.2,[0,0.05],0.8,[0.05,0.1],0.2)
A4	([0.75,0.8],0.7[0.7,0.75,]0.3,[0.2,0.25],0.7,[0.25,0.3],0.3,[0.2,0.25],0.7,[0.25,0.3],0.3)	([0.55,0.6],0.5[0.5,0.55,]0.5,[0.4,0.45],0.5,[0.45,0.5],0.5,[0.4,0.45],0.5,[0.45,0.5],0.5)	([0.55,0.6],0.5[0.5,0.55,]0.5,[0.4,0.45],0.5,[0.45,0.5],0.5,[0.4,0.45],0.5,[0.45,0.5],0.5)	([0.15,0.2],0.8[0.1,0.15,]0.2,[0.8,0.85],0.8,[0.85,0.9],0.2,[0.8,0.85],0.8,[0.85,0.9],0.2)
A5	([0.15,0.2],0.8[0.1,0.15,]0.2,[0.8,0.85],0.8,[0.85,0.9],0.2,[0.8,0.85],0.8,[0.85,0.9],0.2)	([0.75,0.8],0.7[0.7,0.75,]0.3,[0.2,0.25],0.7,[0.25,0.3],0.3,[0.2,0.25],0.7,[0.25,0.3],0.3)	([0.75,0.8],0.7[0.7,0.75,]0.3,[0.2,0.25],0.7,[0.25,0.3],0.3,[0.2,0.25],0.7,[0.25,0.3],0.3)	([0.35,0.4],0.7[0.25,0.35,]0.3,[0.6,0.65],0.7,[0.65,0.75],0.3,[0.6,0.65],0.7,[0.65,0.75],0.3)
A6	([0.35,0.4],0.7[0.25,0.35,]0.3,[0.6,0.65],0.7,[0.65,0.75],0.3,[0.6,0.65],0.7,[0.65,0.75],0.3)	([0.15,0.2],0.8[0.1,0.15,]0.2,[0.8,0.85],0.8,[0.85,0.9],0.2,[0.8,0.85],0.8,[0.85,0.9],0.2)	([0.95,1],0.8[0.9,0.95,]0.2,[0,0.05],0.8,[0.05,0.1],0.2,[0,0.05],0.8,[0.05,0.1],0.2)	([0.55,0.6],0.5[0.5,0.55,]0.5,[0.4,0.45],0.5,[0.45,0.5],0.5,[0.4,0.45],0.5,[0.45,0.5],0.5)
A7	([0.55,0.6],0.5[0.5,0.55,]0.5,[0.4,0.45],0.5,[0.45,0.5],0.5,[0.4,0.45],0.5,[0.45,0.5],0.5)	([0.35,0.4],0.7[0.25,0.35,]0.3,[0.6,0.65],0.7,[0.65,0.75],0.3,[0.6,0.65],0.7,[0.65,0.75],0.3)	([0.75,0.8],0.7[0.7,0.75,]0.3,[0.2,0.25],0.7,[0.25,0.3],0.3,[0.2,0.25],0.7,[0.25,0.3],0.3)	([0.75,0.8],0.7[0.7,0.75,]0.3,[0.2,0.25],0.7,[0.25,0.3],0.3,[0.2,0.25],0.7,[0.25,0.3],0.3)
A8	([0.75,0.8],0.7[0.7,0.75,]0.3,[0.2,0.25],0.7,[0.25,0.3],0.3,[0.2,0.25],0.7,[0.25,0.3],0.3)	([0.55,0.6],0.5[0.5,0.55,]0.5,[0.4,0.45],0.5,[0.45,0.5],0.5,[0.4,0.45],0.5,[0.45,0.5],0.5)	([0.55,0.6],0.5[0.5,0.55,]0.5,[0.4,0.45],0.5,[0.45,0.5],0.5,[0.4,0.45],0.5,[0.45,0.5],0.5)	([0.95,1],0.8[0.9,0.95,]0.2,[0,0.05],0.8,[0.05,0.1],0.2,[0,0.05],0.8,[0.05,0.1],0.2)
A9	([0.15,0.2],0.8[0.1,0.15,]0.2,[0.8,0.85],0.8,[0.85,0.9],0.2,[0.8,0.85],0.8,[0.85,0.9],0.2)	([0.75,0.8],0.7[0.7,0.75,]0.3,[0.2,0.25],0.7,[0.25,0.3],0.3,[0.2,0.25],0.7,[0.25,0.3],0.3)	([0.35,0.4],0.7[0.25,0.35,]0.3,[0.6,0.65],0.7,[0.65,0.75],0.3,[0.6,0.65],0.7,[0.65,0.75],0.3)	([0.75,0.8],0.7[0.7,0.75,]0.3,[0.2,0.25],0.7,[0.25,0.3],0.3,[0.2,0.25],0.7,[0.25,0.3],0.3)
A10	([0.75,0.8],0.7[0.7,0.75,]0.3,[0.2,0.25],0.7,[0.25,0.3],0.3,[0.2,0.25],0.7,[0.25,0.3],0.3)	([0.95,1],0.8[0.9,0.95,]0.2,[0,0.05],0.8,[0.05,0.1],0.2,[0,0.05],0.8,[0.05,0.1],0.2)	([0.15,0.2],0.8[0.1,0.15,]0.2,[0.8,0.85],0.8,[0.85,0.9],0.2,[0.8,0.85],0.8,[0.85,0.9],0.2)	([0.95,1],0.8[0.9,0.95,]0.2,[0,0.05],0.8,[0.05,0.1],0.2,[0,0.05],0.8,[0.05,0.1],0.2)

Table 2. The second PINHFS.

	C1	C2	C3	C4	C5	C6	C7	C8
A1	([0.95,1],0.8[0.9,0.95,]0.2,[0,0.05],0.8,[0.05,0.1],0.2,[0,0.05],0.8,[0.05,0.1],0.2)	([0.55,0.6],0.5[0.5,0.55,]0.5,[0.4,0.45],0.5,[0.45,0.5],0.5,[0.4,0.45],0.5,[0.45,0.5],0.5)	([0.35,0.4],0.7[0.25,0.35,]0.3,[0.6,0.65],0.7,[0.65,0.75],0.3,[0.6,0.65],0.7,[0.65,0.75],0.3)	([0.15,0.2],0.8[0.1,0.15,]0.2,[0.8,0.85],0.8,[0.85,0.9],0.2,[0.8,0.85],0.8,[0.85,0.9],0.2)	([0.95,1],0.8[0.9,0.95,]0.2,[0,0.05],0.8,[0.05,0.1],0.2,[0,0.05],0.8,[0.05,0.1],0.2)	([0.75,0.8],0.7[0.7,0.75,]0.3,[0.2,0.25],0.7,[0.25,0.3],0.3,[0.2,0.25],0.7,[0.25,0.3],0.3)	([0.95,1],0.8[0.9,0.95,]0.2,[0,0.05],0.8,[0.05,0.1],0.2,[0,0.05],0.8,[0.05,0.1],0.2)	([0.95,1],0.8[0.9,0.95,]0.2,[0,0.05],0.8,[0.05,0.1],0.2,[0,0.05],0.8,[0.05,0.1],0.2)
A2	([0.75,0.8],0.7[0.7,0.75,]0.3,[0.2,0.25],0.7,[0.25,0.3],0.3,[0.2,0.25],0.7,[0.25,0.3],0.3)	([0.95,1],0.8[0.9,0.95,]0.2,[0,0.05],0.8,[0.05,0.1],0.2,[0,0.05],0.8,[0.05,0.1],0.2)	([0.75,0.8],0.7[0.7,0.75,]0.3,[0.2,0.25],0.7,[0.25,0.3],0.3,[0.2,0.25],0.7,[0.25,0.3],0.3)	([0.55,0.6],0.5[0.5,0.55,]0.5,[0.4,0.45],0.5,[0.45,0.5],0.5,[0.4,0.45],0.5,[0.45,0.5],0.5)	([0.35,0.4],0.7[0.25,0.35,]0.3,[0.6,0.65],0.7,[0.65,0.75],0.3,[0.6,0.65],0.7,[0.65,0.75],0.3)	([0.15,0.2],0.8[0.1,0.15,]0.2,[0.8,0.85],0.8,[0.85,0.9],0.2,[0.8,0.85],0.8,[0.85,0.9],0.2)	([0.15,0.2],0.8[0.1,0.15,]0.2,[0.8,0.85],0.8,[0.85,0.9],0.2,[0.8,0.85],0.8,[0.85,0.9],0.2)	([0.95,1],0.8[0.9,0.95,]0.2,[0,0.05],0.8,[0.05,0.1],0.2,[0,0.05],0.8,[0.05,0.1],0.2)
A3	([0.55,0.6],0.5[0.5,0.55,]0.5,[0.4,0.45],0.5,[0.45,0.5],0.5,[0.4,0.45],0.5,[0.45,0.5],0.5)	([0.95,1],0.8[0.9,0.95,]0.2,[0,0.05],0.8,[0.05,0.1],0.2,[0,0.05],0.8,[0.05,0.1],0.2)	([0.35,0.4],0.7[0.25,0.35,]0.3,[0.6,0.65],0.7,[0.65,0.75],0.3,[0.6,0.65],0.7,[0.65,0.75],0.3)	([0.15,0.2],0.8[0.1,0.15,]0.2,[0.8,0.85],0.8,[0.85,0.9],0.2,[0.8,0.85],0.8,[0.85,0.9],0.2)	([0.95,1],0.8[0.9,0.95,]0.2,[0,0.05],0.8,[0.05,0.1],0.2,[0,0.05],0.8,[0.05,0.1],0.2)	([0.95,1],0.8[0.9,0.95,]0.2,[0,0.05],0.8,[0.05,0.1],0.2,[0,0.05],0.8,[0.05,0.1],0.2)	([0.15,0.2],0.8[0.1,0.15,]0.2,[0.8,0.85],0.8,[0.85,0.9],0.2,[0.8,0.85],0.8,[0.85,0.9],0.2)	([0.15,0.2],0.8[0.1,0.15,]0.2,[0.8,0.85],0.8,[0.85,0.9],0.2,[0.8,0.85],0.8,[0.85,0.9],0.2)
A4	([0.35,0.4],0.7[0.25,0.35,]0.3,[0.6,0.65],0.7,[0.65,0.75],0.3,[0.6,0.65],0.7,[0.65,0.75],0.3)	([0.75,0.8],0.7[0.7,0.75,]0.3,[0.2,0.25],0.7,[0.25,0.3],0.3,[0.2,0.25],0.7,[0.25,0.3],0.3)	([0.55,0.6],0.5[0.5,0.55,]0.5,[0.4,0.45],0.5,[0.45,0.5],0.5,[0.4,0.45],0.5,[0.45,0.5],0.5)	([0.75,0.8],0.7[0.7,0.75,]0.3,[0.2,0.25],0.7,[0.25,0.3],0.3,[0.2,0.25],0.7,[0.25,0.3],0.3)	([0.95,1],0.8[0.9,0.95,]0.2,[0,0.05],0.8,[0.05,0.1],0.2,[0,0.05],0.8,[0.05,0.1],0.2)	([0.75,0.8],0.7[0.7,0.75,]0.3,[0.2,0.25],0.7,[0.25,0.3],0.3,[0.2,0.25],0.7,[0.25,0.3],0.3)	([0.55,0.6],0.5[0.5,0.55,]0.5,[0.4,0.45],0.5,[0.45,0.5],0.5,[0.4,0.45],0.5,[0.45,0.5],0.5)	([0.35,0.4],0.7[0.25,0.35,]0.3,[0.6,0.65],0.7,[0.65,0.75],0.3,[0.6,0.65],0.7,[0.65,0.75],0.3)
A5	([0.15,0.2],0.8[0.1,0.15,]0.2,[0.8,0.85],0.8,[0.85,0.9],0.2,[0.8,0.85],0.8,[0.85,0.9],0.2)	([0.95,1],0.8[0.9,0.95,]0.2,[0,0.05],0.8,[0.05,0.1],0.2,[0,0.05],0.8,[0.05,0.1],0.2)	([0.15,0.2],0.8[0.1,0.15,]0.2,[0.8,0.85],0.8,[0.85,0.9],0.2,[0.8,0.85],0.8,[0.85,0.9],0.2)	([0.95,1],0.8[0.9,0.95,]0.2,[0,0.05],0.8,[0.05,0.1],0.2,[0,0.05],0.8,[0.05,0.1],0.2)	([0.75,0.8],0.7[0.7,0.75,]0.3,[0.2,0.25],0.7,[0.25,0.3],0.3,[0.2,0.25],0.7,[0.25,0.3],0.3)	([0.55,0.6],0.5[0.5,0.55,]0.5,[0.4,0.45],0.5,[0.45,0.5],0.5,[0.4,0.45],0.5,[0.45,0.5],0.5)	([0.75,0.8],0.7[0.7,0.75,]0.3,[0.2,0.25],0.7,[0.25,0.3],0.3,[0.2,0.25],0.7,[0.25,0.3],0.3)	([0.55,0.6],0.5[0.5,0.55,]0.5,[0.4,0.45],0.5,[0.45,0.5],0.5,[0.4,0.45],0.5,[0.45,0.5],0.5)
A6	([0.55,0.6],0.5[0.5,0.55,]0.5,[0.4,0.45],0.5,[0.45,0.5],0.5,[0.4,0.45],0.5,[0.45,0.5],0.5)	([0.75,0.8],0.7[0.7,0.75,]0.3,[0.2,0.25],0.7,[0.25,0.3],0.3,[0.2,0.25],0.7,[0.25,0.3],0.3)	([0.95,1],0.8[0.9,0.95,]0.2,[0,0.05],0.8,[0.05,0.1],0.2,[0,0.05],0.8,[0.05,0.1],0.2)	([0.75,0.8],0.7[0.7,0.75,]0.3,[0.2,0.25],0.7,[0.25,0.3],0.3,[0.2,0.25],0.7,[0.25,0.3],0.3)	([0.55,0.6],0.5[0.5,0.55,]0.5,[0.4,0.45],0.5,[0.45,0.5],0.5,[0.4,0.45],0.5,[0.45,0.5],0.5)	([0.35,0.4],0.7[0.25,0.35,]0.3,[0.6,0.65],0.7,[0.65,0.75],0.3,[0.6,0.65],0.7,[0.65,0.75],0.3)	([0.95,1],0.8[0.9,0.95,]0.2,[0,0.05],0.8,[0.05,0.1],0.2,[0,0.05],0.8,[0.05,0.1],0.2)	([0.75,0.8],0.7[0.7,0.75,]0.3,[0.2,0.25],0.7,[0.25,0.3],0.3,[0.2,0.25],0.7,[0.25,0.3],0.3)
A7	([0.75,0.8],0.7[0.7,0.75,]0.3,[0.2,0.25],0.7,[0.25,0.3],0.3,[0.2,0.25],0.7,[0.25,0.3],0.3)	([0.55,0.6],0.5[0.5,0.55,]0.5,[0.4,0.45],0.5,[0.45,0.5],0.5,[0.4,0.45],0.5,[0.45,0.5],0.5)	([0.75,0.8],0.7[0.7,0.75,]0.3,[0.2,0.25],0.7,[0.25,0.3],0.3,[0.2,0.25],0.7,[0.25,0.3],0.3)	([0.55,0.6],0.5[0.5,0.55,]0.5,[0.4,0.45],0.5,[0.45,0.5],0.5,[0.4,0.45],0.5,[0.45,0.5],0.5)	([0.35,0.4],0.7[0.25,0.35,]0.3,[0.6,0.65],0.7,[0.65,0.75],0.3,[0.6,0.65],0.7,[0.65,0.75],0.3)	([0.15,0.2],0.8[0.1,0.15,]0.2,[0.8,0.85],0.8,[0.85,0.9],0.2,[0.8,0.85],0.8,[0.85,0.9],0.2)	([0.55,0.6],0.5[0.5,0.55,]0.5,[0.4,0.45],0.5,[0.45,0.5],0.5,[0.4,0.45],0.5,[0.45,0.5],0.5)	([0.95,1],0.8[0.9,0.95,]0.2,[0,0.05],0.8,[0.05,0.1],0.2,[0,0.05],0.8,[0.05,0.1],0.2)
A8	([0.95,1],0.8[0.9,0.95,]0.2,[0,0.05],0.8,[0.05,0.1],0.2,[0,0.05],0.8,[0.05,0.1],0.2)	([0.35,0.4],0.7[0.25,0.35,]0.3,[0.6,0.65],0.7,[0.65,0.75],0.3,[0.6,0.65],0.7,[0.65,0.75],0.3)	([0.55,0.6],0.5[0.5,0.55,]0.5,[0.4,0.45],0.5,[0.45,0.5],0.5,[0.4,0.45],0.5,[0.45,0.5],0.5)	([0.35,0.4],0.7[0.25,0.35,]0.3,[0.6,0.65],0.7,[0.65,0.75],0.3,[0.6,0.65],0.7,[0.65,0.75],0.3)	([0.15,0.2],0.8[0.1,0.15,]0.2,[0.8,0.85],0.8,[0.85,0.9],0.2,[0.8,0.85],0.8,[0.85,0.9],0.2)	([0.35,0.4],0.7[0.25,0.35,]0.3,[0.6,0.65],0.7,[0.65,0.75],0.3,[0.6,0.65],0.7,[0.65,0.75],0.3)	([0.35,0.4],0.7[0.25,0.35,]0.3,[0.6,0.65],0.7,[0.65,0.75],0.3,[0.6,0.65],0.7,[0.65,0.75],0.3)	([0.75,0.8],0.7[0.7,0.75,]0.3,[0.2,0.25],0.7,[0.25,0.3],0.3,[0.2,0.25],0.7,[0.25,0.3],0.3)
A9	([0.75,0.8],0.7[0.7,0.75,]0.3,[0.2,0.25],0.7,[0.25,0.3],0.3,[0.2,0.25],0.7,[0.25,0.3],0.3)	([0.15,0.2],0.8[0.1,0.15,]0.2,[0.8,0.85],0.8,[0.85,0.9],0.2,[0.8,0.85],0.8,[0.85,0.9],0.2)	([0.35,0.4],0.7[0.25,0.35,]0.3,[0.6,0.65],0.7,[0.65,0.75],0.3,[0.6,0.65],0.7,[0.65,0.75],0.3)	([0.15,0.2],0.8[0.1,0.15,]0.2,[0.8,0.85],0.8,[0.85,0.9],0.2,[0.8,0.85],0.8,[0.85,0.9],0.2)	([0.15,0.2],0.8[0.1,0.15,]0.2,[0.8,0.85],0.8,[0.85,0.9],0.2,[0.8,0.85],0.8,[0.85,0.9],0.2)	([0.15,0.2],0.8[0.1,0.15,]0.2,[0.8,0.85],0.8,[0.85,0.9],0.2,[0.8,0.85],0.8,[0.85,0.9],0.2)	([0.15,0.2],0.8[0.1,0.15,]0.2,[0.8,0.85],0.8,[0.85,0.9],0.2,[0.8,0.85],0.8,[0.85,0.9],0.2)	([0.95,1],0.8[0.9,0.95,]0.2,[0,0.05],0.8,[0.05,0.1],0.2,[0,0.05],0.8,[0.05,0.1],0.2)
A10	([0.95,1],0.8[0.9,0.95,]0.2,[0,0.05],0.8,[0.05,0.1],0.2,[0,0.05],0.8,[0.05,0.1],0.2)	([0.15,0.2],0.8[0.1,0.15,]0.2,[0.8,0.85],0.8,[0.85,0.9],0.2,[0.8,0.85],0.8,[0.85,0.9],0.2)	([0.15,0.2],0.8[0.1,0.15,]0.2,[0.8,0.85],0.8,[0.85,0.9],0.2,[0.8,0.85],0.8,[0.85,0.9],0.2)	([0.55,0.6],0.5[0.5,0.55,]0.5,[0.4,0.45],0.5,[0.45,0.5],0.5,[0.4,0.45],0.5,[0.45,0.5],0.5)	([0.75,0.8],0.7[0.7,0.75,]0.3,[0.2,0.25],0.7,[0.25,0.3],0.3,[0.2,0.25],0.7,[0.25,0.3],0.3)	([0.95,1],0.8[0.9,0.95,]0.2,[0,0.05],0.8,[0.05,0.1],0.2,[0,0.05],0.8,[0.05,0.1],0.2)	([0.95,1],0.8[0.9,0.95,]0.2,[0,0.05],0.8,[0.05,0.1],0.2,[0,0.05],0.8,[0.05,0.1],0.2)	([0.15,0.2],0.8[0.1,0.15,]0.2,[0.8,0.85],0.8,[0.85,0.9],0.2,[0.8,0.85],0.8,[0.85,0.9],0.2)

Table 3. The third PINHFS.

	C1	C2	C3	C4	C5	C6	C7	C8
A1	([0.75,0.8],0.7[0.7,0.75,]0.3,[0.2,0.25],0.7,[0.25,0.3],0.3,[0.2,0.25],0.7,[0.25,0.3],0.3)	([0.55,0.6],0.5[0.5,0.55,]0.5,[0.4,0.45],0.5,[0.45,0.5],0.5,[0.4,0.45],0.5,[0.45,0.5],0.5)	([0.35,0.4],0.7[0.25,0.35,]0.3,[0.6,0.65],0.7,[0.65,0.75],0.3,[0.6,0.65],0.7,[0.65,0.75],0.3)	([0.15,0.2],0.8[0.1,0.15,]0.2,[0.8,0.85],0.8,[0.85,0.9],0.2,[0.8,0.85],0.8,[0.85,0.9],0.2)	([0.95,1],0.8[0.9,0.95,]0.2,[0,0.05],0.8,[0.05,0.1],0.2,[0,0.05],0.8,[0.05,0.1],0.2)	([0.75,0.8],0.7[0.7,0.75,]0.3,[0.2,0.25],0.7,[0.25,0.3],0.3,[0.2,0.25],0.7,[0.25,0.3],0.3)	([0.95,1],0.8[0.9,0.95,]0.2,[0,0.05],0.8,[0.05,0.1],0.2,[0,0.05],0.8,[0.05,0.1],0.2)	([0.95,1],0.8[0.9,0.95,]0.2,[0,0.05],0.8,[0.05,0.1],0.2,[0,0.05],0.8,[0.05,0.1],0.2)
A2	([0.75,0.8],0.7[0.7,0.75,]0.3,[0.2,0.25],0.7,[0.25,0.3],0.3,[0.2,0.25],0.7,[0.25,0.3],0.3)	([0.95,1],0.8[0.9,0.95,]0.2,[0,0.05],0.8,[0.05,0.1],0.2,[0,0.05],0.8,[0.05,0.1],0.2)	([0.75,0.8],0.7[0.7,0.75,]0.3,[0.2,0.25],0.7,[0.25,0.3],0.3,[0.2,0.25],0.7,[0.25,0.3],0.3)	([0.55,0.6],0.5[0.5,0.55,]0.5,[0.4,0.45],0.5,[0.45,0.5],0.5,[0.4,0.45],0.5,[0.45,0.5],0.5)	([0.35,0.4],0.7[0.25,0.35,]0.3,[0.6,0.65],0.7,[0.65,0.75],0.3,[0.6,0.65],0.7,[0.65,0.75],0.3)	([0.15,0.2],0.8[0.1,0.15,]0.2,[0.8,0.85],0.8,[0.85,0.9],0.2,[0.8,0.85],0.8,[0.85,0.9],0.2)	([0.15,0.2],0.8[0.1,0.15,]0.2,[0.8,0.85],0.8,[0.85,0.9],0.2,[0.8,0.85],0.8,[0.85,0.9],0.2)	([0.75,0.8],0.7[0.7,0.75,]0.3,[0.2,0.25],0.7,[0.25,0.3],0.3,[0.2,0.25],0.7,[0.25,0.3],0.3)
A3	([0.95,1],0.8[0.9,0.95,]0.2,[0,0.05],0.8,[0.05,0.1],0.2,[0,0.05],0.8,[0.05,0.1],0.2)	([0.95,1],0.8[0.9,0.95,]0.2,[0,0.05],0.8,[0.05,0.1],0.2,[0,0.05],0.8,[0.05,0.1],0.2)	([0.35,0.4],0.7[0.25,0.35,]0.3,[0.6,0.65],0.7,[0.65,0.75],0.3,[0.6,0.65],0.7,[0.65,0.75],0.3)	([0.15,0.2],0.8[0.1,0.15,]0.2,[0.8,0.85],0.8,[0.85,0.9],0.2,[0.8,0.85],0.8,[0.85,0.9],0.2)	([0.95,1],0.8[0.9,0.95,]0.2,[0,0.05],0.8,[0.05,0.1],0.2,[0,0.05],0.8,[0.05,0.1],0.2)	([0.95,1],0.8[0.9,0.95,]0.2,[0,0.05],0.8,[0.05,0.1],0.2,[0,0.05],0.8,[0.05,0.1],0.2)	([0.35,0.4],0.7[0.25,0.35,]0.3,[0.6,0.65],0.7,[0.65,0.75],0.3,[0.6,0.65],0.7,[0.65,0.75],0.3)	([0.95,1],0.8[0.9,0.95,]0.2,[0,0.05],0.8,[0.05,0.1],0.2,[0,0.05],0.8,[0.05,0.1],0.2)
A4	([0.15,0.2],0.8[0.1,0.15,]0.2,[0.8,0.85],0.8,[0.85,0.9],0.2,[0.8,0.85],0.8,[0.85,0.9],0.2)	([0.75,0.8],0.7[0.7,0.75,]0.3,[0.2,0.25],0.7,[0.25,0.3],0.3,[0.2,0.25],0.7,[0.25,0.3],0.3)	([0.55,0.6],0.5[0.5,0.55,]0.5,[0.4,0.45],0.5,[0.45,0.5],0.5,[0.4,0.45],0.5,[0.45,0.5],0.5)	([0.75,0.8],0.7[0.7,0.75,]0.3,[0.2,0.25],0.7,[0.25,0.3],0.3,[0.2,0.25],0.7,[0.25,0.3],0.3)	([0.95,1],0.8[0.9,0.95,]0.2,[0,0.05],0.8,[0.05,0.1],0.2,[0,0.05],0.8,[0.05,0.1],0.2)	([0.75,0.8],0.7[0.7,0.75,]0.3,[0.2,0.25],0.7,[0.25,0.3],0.3,[0.2,0.25],0.7,[0.25,0.3],0.3)	([0.55,0.6],0.5[0.5,0.55,]0.5,[0.4,0.45],0.5,[0.45,0.5],0.5,[0.4,0.45],0.5,[0.45,0.5],0.5)	([0.15,0.2],0.8[0.1,0.15,]0.2,[0.8,0.85],0.8,[0.85,0.9],0.2,[0.8,0.85],0.8,[0.85,0.9],0.2)
A5	([0.35,0.4],0.7[0.25,0.35,]0.3,[0.6,0.65],0.7,[0.65,0.75],0.3,[0.6,0.65],0.7,[0.65,0.75],0.3)	([0.95,1],0.8[0.9,0.95,]0.2,[0,0.05],0.8,[0.05,0.1],0.2,[0,0.05],0.8,[0.05,0.1],0.2)	([0.15,0.2],0.8[0.1,0.15,]0.2,[0.8,0.85],0.8,[0.85,0.9],0.2,[0.8,0.85],0.8,[0.85,0.9],0.2)	([0.95,1],0.8[0.9,0.95,]0.2,[0,0.05],0.8,[0.05,0.1],0.2,[0,0.05],0.8,[0.05,0.1],0.2)	([0.75,0.8],0.7[0.7,0.75,]0.3,[0.2,0.25],0.7,[0.25,0.3],0.3,[0.2,0.25],0.7,[0.25,0.3],0.3)	([0.95,1],0.8[0.9,0.95,]0.2,[0,0.05],0.8,[0.05,0.1],0.2,[0,0.05],0.8,[0.05,0.1],0.2)	([0.75,0.8],0.7[0.7,0.75,]0.3,[0.2,0.25],0.7,[0.25,0.3],0.3,[0.2,0.25],0.7,[0.25,0.3],0.3)	([0.35,0.4],0.7[0.25,0.35,]0.3,[0.6,0.65],0.7,[0.65,0.75],0.3,[0.6,0.65],0.7,[0.65,0.75],0.3)

A6	([0.55,0.6],0.5[0.5,0.55,]0.5,[0.4,0.45],0.5,[0.45,0.5],0.5,[0.4,0.45],0.5,[0.45,0.5],0.5)	([0.15,0.2],0.8[0.1,0.15,]0.2,[0.8,0.85],0.8,[0.85,0.9],0.2,[0.8,0.85],0.8,[0.85,0.9],0.2)	([0.35,0.4],0.7[0.25,0.35,]0.3,[0.6,0.65],0.7,[0.65,0.75],0.3,[0.6,0.65],0.7,[0.65,0.75],0.3)	([0.75,0.8],0.7[0.7,0.75,]0.3,[0.2,0.25],0.7,[0.25,0.3],0.3,[0.2,0.25],0.7,[0.25,0.3],0.3)	([0.75,0.8],0.7[0.7,0.75,]0.3,[0.2,0.25],0.7,[0.25,0.3],0.3,[0.2,0.25],0.7,[0.25,0.3],0.3)	([0.75,0.8],0.7[0.7,0.75,]0.3,[0.2,0.25],0.7,[0.25,0.3],0.3,[0.2,0.25],0.7,[0.25,0.3],0.3)	([0.95,1],0.8[0.9,0.95,]0.2,[0,0.05],0.8,[0.05,0.1],0.2,[0,0.05],0.8,[0.05,0.1],0.2)	([0.55,0.6],0.5[0.5,0.55,]0.5,[0.4,0.45],0.5,[0.45,0.5],0.5,[0.4,0.45],0.5,[0.45,0.5],0.5)
A7	([0.75,0.8],0.7[0.7,0.75,]0.3,[0.2,0.25],0.7,[0.25,0.3],0.3,[0.2,0.25],0.7,[0.25,0.3],0.3)	([0.35,0.4],0.7[0.25,0.35,]0.3,[0.6,0.65],0.7,[0.65,0.75],0.3,[0.6,0.65],0.7,[0.65,0.75],0.3)	([0.15,0.2],0.8[0.1,0.15,]0.2,[0.8,0.85],0.8,[0.85,0.9],0.2,[0.8,0.85],0.8,[0.85,0.9],0.2)	([0.95,1],0.8[0.9,0.95,]0.2,[0,0.05],0.8,[0.05,0.1],0.2,[0,0.05],0.8,[0.05,0.1],0.2)	([0.55,0.6],0.5[0.5,0.55,]0.5,[0.4,0.45],0.5,[0.45,0.5],0.5,[0.4,0.45],0.5,[0.45,0.5],0.5)	([0.55,0.6],0.5[0.5,0.55,]0.5,[0.4,0.45],0.5,[0.45,0.5],0.5,[0.4,0.45],0.5,[0.45,0.5],0.5)	([0.75,0.8],0.7[0.7,0.75,]0.3,[0.2,0.25],0.7,[0.25,0.3],0.3,[0.2,0.25],0.7,[0.25,0.3],0.3)	([0.75,0.8],0.7[0.7,0.75,]0.3,[0.2,0.25],0.7,[0.25,0.3],0.3,[0.2,0.25],0.7,[0.25,0.3],0.3)
A8	([0.95,1],0.8[0.9,0.95,]0.2,[0,0.05],0.8,[0.05,0.1],0.2,[0,0.05],0.8,[0.05,0.1],0.2)	([0.55,0.6],0.5[0.5,0.55,]0.5,[0.4,0.45],0.5,[0.45,0.5],0.5,[0.4,0.45],0.5,[0.45,0.5],0.5)	([0.95,1],0.8[0.9,0.95,]0.2,[0,0.05],0.8,[0.05,0.1],0.2,[0,0.05],0.8,[0.05,0.1],0.2)	([0.15,0.2],0.8[0.1,0.15,]0.2,[0.8,0.85],0.8,[0.85,0.9],0.2,[0.8,0.85],0.8,[0.85,0.9],0.2)	([0.35,0.4],0.7[0.25,0.35,]0.3,[0.6,0.65],0.7,[0.65,0.75],0.3,[0.6,0.65],0.7,[0.65,0.75],0.3)	([0.35,0.4],0.7[0.25,0.35,]0.3,[0.6,0.65],0.7,[0.65,0.75],0.3,[0.6,0.65],0.7,[0.65,0.75],0.3)	([0.55,0.6],0.5[0.5,0.55,]0.5,[0.4,0.45],0.5,[0.45,0.5],0.5,[0.4,0.45],0.5,[0.45,0.5],0.5)	([0.95,1],0.8[0.9,0.95,]0.2,[0,0.05],0.8,[0.05,0.1],0.2,[0,0.05],0.8,[0.05,0.1],0.2)
A9	([0.75,0.8],0.7[0.7,0.75,]0.3,[0.2,0.25],0.7,[0.25,0.3],0.3,[0.2,0.25],0.7,[0.25,0.3],0.3)	([0.75,0.8],0.7[0.7,0.75,]0.3,[0.2,0.25],0.7,[0.25,0.3],0.3,[0.2,0.25],0.7,[0.25,0.3],0.3)	([0.75,0.8],0.7[0.7,0.75,]0.3,[0.2,0.25],0.7,[0.25,0.3],0.3,[0.2,0.25],0.7,[0.25,0.3],0.3)	([0.75,0.8],0.7[0.7,0.75,]0.3,[0.2,0.25],0.7,[0.25,0.3],0.3,[0.2,0.25],0.7,[0.25,0.3],0.3)	([0.15,0.2],0.8[0.1,0.15,]0.2,[0.8,0.85],0.8,[0.85,0.9],0.2,[0.8,0.85],0.8,[0.85,0.9],0.2)	([0.15,0.2],0.8[0.1,0.15,]0.2,[0.8,0.85],0.8,[0.85,0.9],0.2,[0.8,0.85],0.8,[0.85,0.9],0.2)	([0.35,0.4],0.7[0.25,0.35,]0.3,[0.6,0.65],0.7,[0.65,0.75],0.3,[0.6,0.65],0.7,[0.65,0.75],0.3)	([0.75,0.8],0.7[0.7,0.75,]0.3,[0.2,0.25],0.7,[0.25,0.3],0.3,[0.2,0.25],0.7,[0.25,0.3],0.3)
A10	([0.95,1],0.8[0.9,0.95,]0.2,[0,0.05],0.8,[0.05,0.1],0.2,[0,0.05],0.8,[0.05,0.1],0.2)	([0.15,0.2],0.8[0.1,0.15,]0.2,[0.8,0.85],0.8,[0.85,0.9],0.2,[0.8,0.85],0.8,[0.85,0.9],0.2)	([0.35,0.4],0.7[0.25,0.35,]0.3,[0.6,0.65],0.7,[0.65,0.75],0.3,[0.6,0.65],0.7,[0.65,0.75],0.3)	([0.55,0.6],0.5[0.5,0.55,]0.5,[0.4,0.45],0.5,[0.45,0.5],0.5,[0.4,0.45],0.5,[0.45,0.5],0.5)	([0.75,0.8],0.7[0.7,0.75,]0.3,[0.2,0.25],0.7,[0.25,0.3],0.3,[0.2,0.25],0.7,[0.25,0.3],0.3)	([0.95,1],0.8[0.9,0.95,]0.2,[0,0.05],0.8,[0.05,0.1],0.2,[0,0.05],0.8,[0.05,0.1],0.2)	([0.15,0.2],0.8[0.1,0.15,]0.2,[0.8,0.85],0.8,[0.85,0.9],0.2,[0.8,0.85],0.8,[0.85,0.9],0.2)	([0.95,1],0.8[0.9,0.95,]0.2,[0,0.05],0.8,[0.05,0.1],0.2,[0,0.05],0.8,[0.05,0.1],0.2)

Then we show the criteria weights using the average method. Criteria weights presents the relative importance (weights) assigned to eight evaluation criteria used in a multi-criteria decision-making (MCDM) framework. These weights reflect the perceived significance of each criterion in the overall evaluation process and are typically derived using methods such as average method. A higher weight indicates greater influence in the final decision or ranking.

- C8 and C1 are the top-priority criteria, likely to represent core goals or success factors in the evaluation context.
- C3 and C4 are the least weighted, perhaps indicating supportive or supplementary roles.
- The overall distribution of weights is relatively balanced, ensuring no extreme bias toward any single factor.

We compute the normalized decision matrix using eqs. (12 and 13) as shown in Fig 1.

The power weighted decision matrix is computed using eq. (14) as shown in Fig 2.

The total weighted decision matrix is computed using eq. (15) as shown in Fig 3.

The three strategies are used to compute the relative weight of every alternative using eqs. (16-18) as shown in Fig 4.

Obtain the final value of each alternative using eq. (19) as shown in Fig 5.

Rank the alternatives as:

- A4: 1: Top-performing alternative; this option outperforms all others in the evaluation.
- A2: 2: Very strong performer, closely trailing behind P4 in overall effectiveness.
- A9: 3: A solid option, performing well above the median compared to other alternatives.
- A5: 4: Slightly above average, demonstrating competent performance.
- A3: 5: Average performer; meets the baseline expectations with some strengths.

- A10: 6: Slightly below average, but still within a reasonable performance range.
- A1: 7: Moderate ranking; may need improvement in certain evaluated criteria.
- A6: 8: Below average; indicates limited effectiveness in key assessment areas.
- A7: 9: Poor performer; among the least favorable alternatives based on evaluation results.
- A8: 10: Lowest-ranked alternative; significant gaps in meeting evaluation standards.
- Insights
- A4 is the most suitable or effective alternative according to the ranking system, possibly excelling across multiple weighted criteria.
- A2 and A9 are also strong candidates for implementation or prioritization.
- A8 and A7 are at the bottom, suggesting the need for substantial revisions or reconsideration in decision-making contexts.

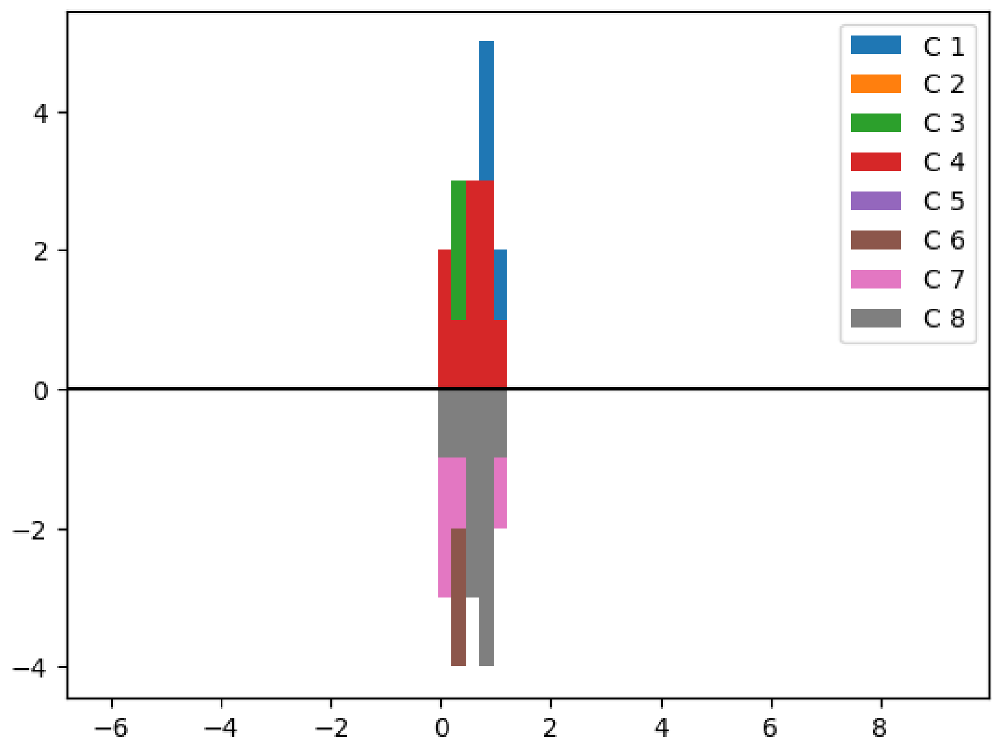

Fig 1. The normalized decision matrix.

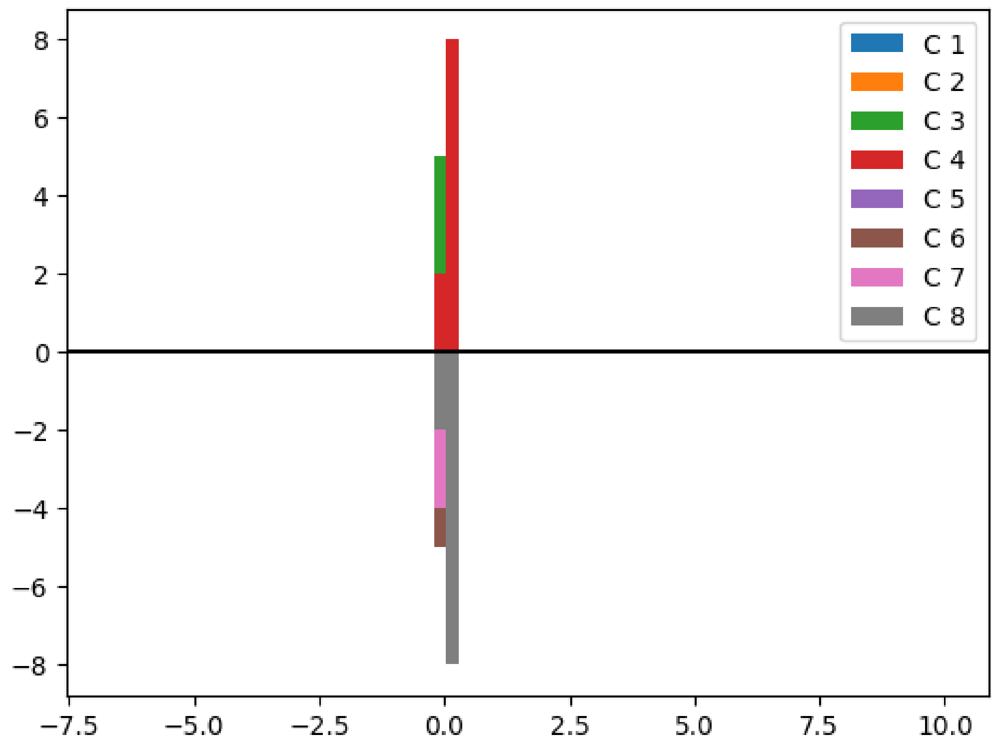

Fig 2. The power weighted decision matrix

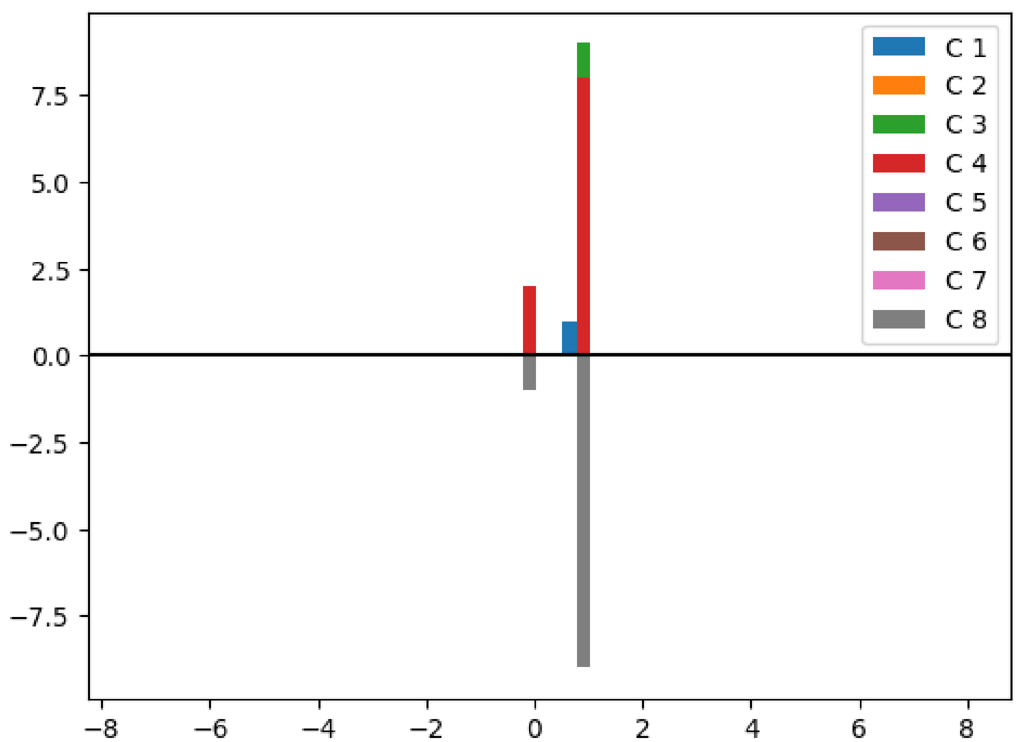

Fig 3. The total weighted decision matrix.

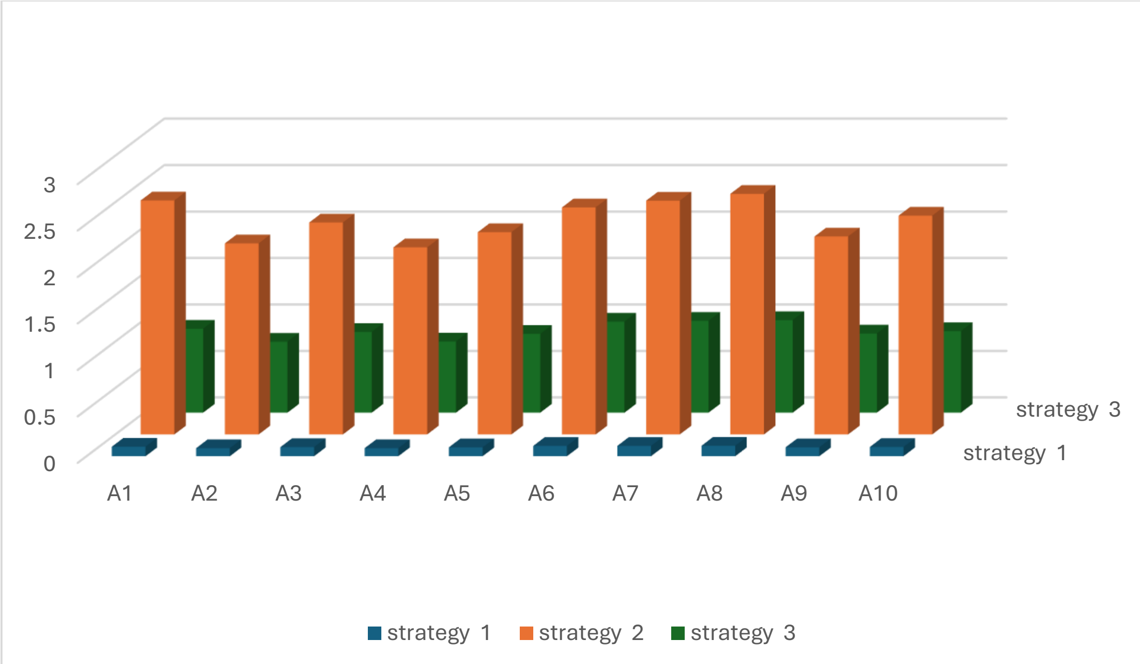

Fig 4. Three strategies values.

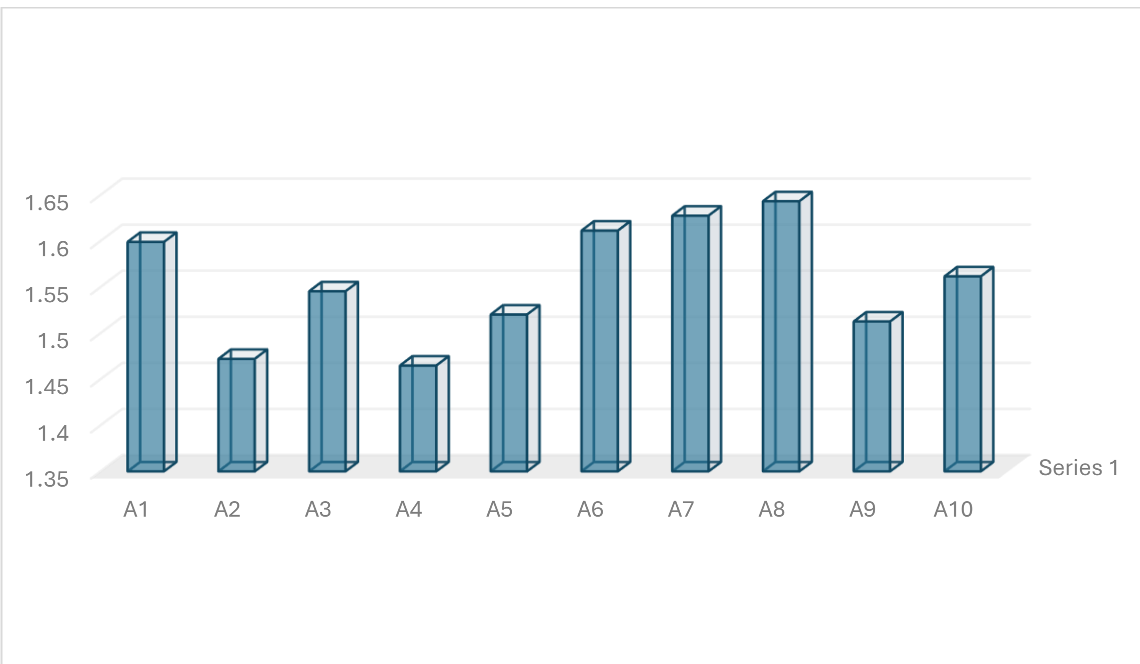

Fig 5. The final score of each alternative.

4. Analysis

This section shows the results of sensitivity analysis, we change the value parameter in the CoCoSo method, then we rank the alternatives. The values are changed between 0 and 1. Fig 6 shows the values of each alternative under different cases. Fig 7 shows the ranks of alternatives.

Fig 6 provided a multi-case evaluation where each case corresponds to different instances of evaluation for a set of alternatives (A1 through A10). Each cell contains a numerical value that represents the score or evaluation of a specific alternative (A1, A2, ..., A10) for a given case (Case 1, Case 2, ..., Case 10).

1. Alternatives (A1 - A10): These are the different options being evaluated. The alternatives could represent different solutions, methodologies, or approaches being assessed in each case.
2. Cases (Case 1 - Case 10): These represent different scenarios, instances, or conditions under which the alternatives are evaluated. For each case, the performance or evaluation of each alternative is recorded.
3. Numerical Values: The numerical values in the Fig 6 represent the evaluation score or performance of each alternative in a given case. Higher values suggest better performance or suitability, depending on the context of the evaluation.

- Alternative A8 consistently has the highest scores across all cases. This indicates that A8 is the most favored or performs best across the evaluated conditions.
- Alternative A7 generally holds strong performance but falls short when compared to A8 and A6 in some cases.
- Alternative A9 and Alternative A4 consistently show the lowest scores across multiple cases, suggesting that these alternatives may not be as effective or suitable for the given scenarios.
- Alternative A10 shows strong performance in the later cases (Case 9, Case 10), but its scores are relatively moderate in the earlier cases.
- In general, the differences in scores among alternatives are subtle, indicating that the evaluated alternatives are somewhat comparable but still exhibit varying degrees of suitability depending on the specific case.

Fig 6. The final score of each alternative.

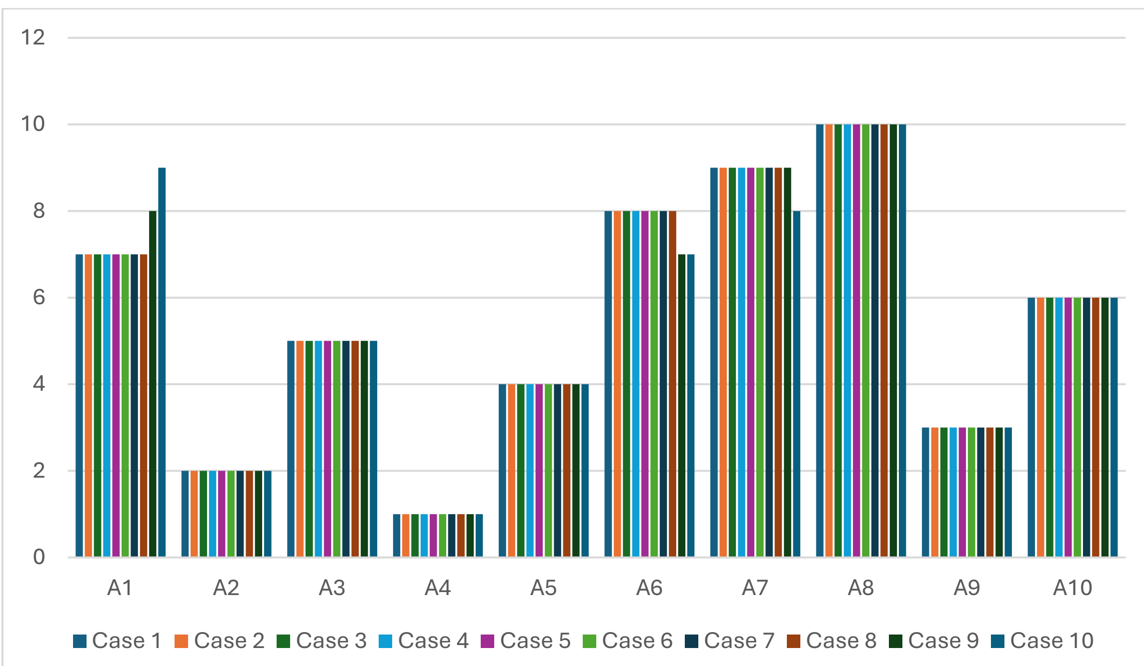

Fig 7. The final ranks of alternatives.

5. Conclusions

The strategic evaluation presented in this research contributes a much-needed lens for assessing journalism and communication instruction through a multidimensional framework. By aligning educational strategies with real-world media demands and student learning preferences, the study underscores the importance of agility in pedagogical design. The findings encourage higher education institutions to embrace innovation while preserving core journalistic values. Future research could extend this model to global journalism programs, examining cross-cultural adaptations and new technological interventions. This study used the MCDM approach to compute the criteria weights and ranking the alternatives. We used CoCoSo method to rank the alternatives. We used the Probabilistic interval neutrosophic hesitant fuzzy set to overcome uncertainty and vague information. Numerical examples are provided in this study.

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