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A multi-criteria model for the selection of candidates: Application to a teaching competition at the National University of Córdoba

Un modelo multicriterio para la selección de candidatos: aplicación a un concurso docente en la Universidad Nacional de Córdoba

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Abstract

This paper proposes a discrete multicriteria decision method to facilitate the task of deciding in a group the selection of candidates for a particular job. The objective of the decision-making group is to agree on an order of merit of the applicants. In the proposed model, distance to an ideal is used to achieve individual order merit. The individual priorities provided by the multiple evaluators are synthesized and integrated in a single decision through the application of the geometric mean. The developed method does not present a range reversal. The methodology is applied to a real case of selection of candidates for teaching positions. It was observed that the model facilitates the task of the decision group and grants transparency and legitimization of the final opinion. From the point of group decisions, the final order is equitable if it is considered that it is constructed and shaped by the individual decisions of each evaluator.

JEL Code: C02, C44, C65
Keywords: multicriterial decision model; evaluation of candidates; group decisions; selection of university professors.

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Resumen

En este trabajo se propone un método de decisión multicriterio discreto para facilitar la tarea de decidir en grupo la selección de candidatos a determinado puesto de trabajo. El objetivo del grupo decisor es acordar un orden de mérito de los aspirantes. En el modelo propuesto se utiliza distancia a un ideal para lograr un orden mérito individual. Se sintetizan e integran las prioridades individuales proporcionadas por los múltiples evaluadores en una decisión única mediante la aplicación de la media geométrica. El método desarrollado no presenta reversión de rango. La metodología se aplica a un caso real de selección de postulantes a cargos docentes. Se observó que el modelo facilita la tarea del tribunal y otorga transparencia y legitimación del dictamen final. Desde el punto de las decisiones grupales, el orden final resulta equitativo si se considera que se construye y se conforma a partir de las decisiones individuales de cada evaluador.

Código JEL: C02, C44, C65
Palabras clave: modelo multicriterio; evaluación de candidatos; decisiones grupales; selección de profesores universitarios

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Introduction

Personnel evaluation and selection is a critical activity in organizations. A suitable and flexible method is needed to evaluate each candidate's performance according to job requirements. When several evaluators are involved in the selection, the problem is a typical case of a multi-criteria group decision.

This paper aims to propose a discrete multi-criteria decision method (MCDM) to facilitate the task of deciding in a group the selection of personnel for a given job. The deciding group must agree on the candidates' ranking or merit order. These problems are known within multi-criteria analysis as γ-type problems (Roy, 1985).

Several authors have applied MCDM to solve job applicant selection problems. Dagdeviren (2010) described a hybrid model (ANP and TOPSIS) to support the personnel selection process in manufacturing systems. Koç & Burhan (2014) applied the AHP method to select a strategic supplier in a glass manufacturing company in Turkey. Cables, Lamata, and Verdegay (2016) developed the RIM method and presented its application to a selection process of five driver applicants in a company. Chen, Hwang, and Hung (2009) applied the PROMETHEE method using linguistic variables to express the information in the qualitative criteria.

García Alcaraz, et al. (2009) used the TOPSIS method for group decisions. They proposed a rating scale determined a priori and calculated the synthesis opinion by determining the average of the ratings proposed by each evaluator. Furthermore, Hsu-Shih Shih et al. (2007) worked with multiple evaluators and proposed an extension of the TOPSIS method for group decisions in which preferences are aggregated within the same procedure, and compared the effects of external and internal aggregation of group preferences with different computational combinations.

In the case of this study, the method was developed to be applied in the evaluation of applicants to obtain a university teaching position through a public competitive examination at the Faculty of Economic Sciences (FCE) of the National University of Córdoba (UNC), Argentina. In order to minimize disagreements among applicants[1] and among the examining board members, it is proposed to standardize the process of admission and promotion of teachers by designing a procedural system for the evaluation of applicants. Modifications are introduced to the TOPSIS method (Hwang et al., 1981) that allow the resulting model to be better adjusted to the real circumstances of the problem analyzed and provide more accurate results. The model is presented in a general way so that it can be used in any group decision process of personnel selection.

This paper is organized as follows: Section 2 describes the characteristics of the National University of Cordoba concerning the form of hiring of its teaching staff; Section 3 presents the formulation of the proposed multi-criteria model; Section 4 shows the application to the case of public competition at the UNC; and section 5 presents the conclusions.

Description of the system for admission and promotion of teachers at UNC

The National University of Córdoba, founded in 1613, is the oldest university in Argentina. It offers free and secular education at no cost. To give an idea of the magnitude and importance of the UNC, it can be pointed out that this institution has approximately 10 000 teaching positions, 150 000 students, and 3 000 non-teaching positions. Although it enjoys autonomy to manage its budget, elect its authorities, and dictate its rules, it is financially dependent on the National State. For this reason, as in all public entities, its decisions—from the most complex and strategic to the most routine and operational—should be explained and justified through processes that demonstrate equity and justice.

The Statute of the UNC delegates to their respective Academic Units (15 Faculties) the power to establish a public competitive examination system to incorporate and promote their professors. This procedure[2] is regulated in the Faculty of Economics by Ordinance No. 323/88 of the Honorable Board of Directors and its amendments. Applicants for a position or a higher position must undergo a formal evaluation process carried out by an *ad hoc* panel of three members. The current regulation establishes that the panel must evaluate the applicant's background and a competitive examination consisting of an

[1]Thus, avoiding challenges to the board's verdict
[2]For teaching assistants

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oral and public class and a subsequent interview. The regulation is broad, determines the aspects to be considered in large categories, and establishes the relative weight each category provides to the final grade. Although the flexibility of the legislation confers a certain autonomy on the panel, it also allows for differences between the different evaluation processes. As a consequence of the discretion applied by the different panels, it is common for contestants to file requests for the extension of opinions, challenges, or recusals. If the differences are not resolved in the administrative bodies, through the appeals for reconsideration and hierarchical appeals in subsidy, they may continue their claims through the courts.

In this context, and to minimize disagreements among the contestants, a discrete multi-criteria decision model, adapted to group decision-making, is presented for the selection of candidates for teaching positions to give legitimacy and transparency to the selection process.

Methodology

Within the framework of discrete multi-criteria analysis, a method is proposed that uses distance to an ideal to achieve an order of merit and thus standardize applicants' admission and promotion process. The method is based on the following assumptions:

a) cardinal scales are used, which are then converted into dimensionless numbers through a normalization process. For this reason, when dealing with linguistic labels, they are transformed into a quantitative scale. It also considers that the preference achieved through ordinal numbers is weaker than that obtained with cardinality.

b) the choice set has a finite number of alternatives.

c) there is a correspondence between the attributes and the objectives of the problem. This relationship determines the meaning of the evaluation criteria (maximum or minimum).

The procedure is as follows: a data matrix representing the ratings of each alternative for each criterion, generally called response matrix, is used as a starting point. An ideal alternative is defined, which will be formed by the highest value of the scale used in the case of attributes to be maximized, and the lowest value in the case of attributes to be minimized.

Then, a second normalized matrix is constructed, weighted by a vector of weights, representing the relative importance of each criterion. The ordering is performed according to the proximity to the reference point, using the Euclidean distance to perform this measurement. Finally, the individual decisions are synthesized using the geometric mean.

Formally:

1. The starting point is a matrix of alternative ratings for each criterion:

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$$\begin{array}{c} \\ \begin{bmatrix} A_1 \\ A_2 \\ \dots \\ A_i \\ A_m \end{bmatrix} \end{array} \begin{array}{c} \begin{bmatrix} C_1 & C_2 & \dots & C_j & C_n \end{bmatrix} \\ \begin{bmatrix} x_{11} & x_{12} & \dots & x_{1j} & x_{1n} \\ x_{21} & x_{22} & \dots & x_{2j} & x_{2n} \\ \dots & \dots & \dots & \dots & \dots \\ x_{i1} & x_{i2} & \dots & x_{ij} & x_{in} \\ x_{m1} & x_{m2} & \dots & x_{mj} & x_{mn} \end{bmatrix} \end{array}$$

(1)

2. The ideal point or alternative $A^+ = [x_j^+]$ is constructed. This reference alternative is composed of the best possible evaluation for each criterion. That is, the highest or the lowest value of the scale used, according to the objective.

$$A^+ = \begin{bmatrix} x_1^+ & x_2^+ & \dots & x_j^+ & x_n^+ \end{bmatrix}$$

(2)

3. The matrix obtained in [1] and the ideal obtained in [2] are normalized by dividing each element by x_j^+

$$\overline{X} = \begin{bmatrix} \overline{x_{ij}} \end{bmatrix} \qquad \overline{A^+} = \begin{bmatrix} \overline{x_j^+} \end{bmatrix}$$

(3)

The construction of this ratio—explained in Barba Romero and Pomerol (1997) as a normalization procedure—has the advantage of transforming an n-dimensional vector into another vector, also of n components, which respects proportionality and allows inter- and intra-criteria dimensionless comparison.

4. The vector of criteria weights is defined as:

$$W = \begin{bmatrix} w_1 & w_2 & \dots & w_n \end{bmatrix}$$

(4)

5. The ratio matrix and the normalized ideal [3] are weighted by the vector of weights.

$$V = \begin{bmatrix} v_{ij} \end{bmatrix} \qquad V^+ = \begin{bmatrix} v_j^+ \end{bmatrix}$$

(5)

6. The Euclidean metric measures the distance between each alternative and the reference point.

$$\mathrm{d}_i = \left[\sum_{j}^{n} \left| v_{ij} - v_j^{+} \right|^2 \right]^{\frac{1}{2}} \tag{6}$$

d_i measures the Euclidean distance between the alternative A_i and the ideal reference alternative A^+.

7. According to the evaluation obtained in the previous step, a ranking of preferences is determined according to the shortest distance to the ideal.

8. Since the problem presented corresponds to a group decision, and since the previous step will produce as many evaluations and rankings as there are decision-makers in the decision group, it is proposed to add the individual decisions through a synthesis operation $\otimes$:

$$\mathrm{DG} = \otimes \mathrm{d}^{j}(\mathrm{A}_{i}) \tag{7}$$

Where:

DG = (*Decisión Grupal*) Group Decision

$\otimes$ = synthesis operation

$\mathrm{d}^{j}(\mathrm{A}_{i})$ = aggregation function of the method for alternative i and decision maker j.

The final group decision is represented by the ordering resulting from the synthesis operation. It is proposed to use the geometric mean:

$$\mathrm{DG} = \sqrt[n]{\prod_{j=1}^{n} \mathrm{d}^{j}(\mathrm{A}_{i})} \tag{8}$$

This results in a unified decision-making process for all evaluators that is easily applicable to many real-life situations.

In addition, and as demonstrated by García-Cascales and Lamata (2012), the proposed method does not present rank reversion[3]; an important aspect that is not present in several multi-criteria methods.

[3]A multicriteria problem is said to have rank reversion when the order of preference of the alternatives changes if an alternative is added to or removed from the decision problem.

Application

The application of the model is developed to select candidates to fill teaching assistant positions by public competition in the Faculty of Economics of the UNC. The evaluation is based on the background of each applicant, a competitive examination, and a personal interview. There are 5 (five) positions to be filled, and 11 (eleven) applicants submitted their applications. For confidentiality reasons, the name of the subject matter of the competition is withheld, as well as the names of the candidates. For this reason, candidates will be identified by the letters {A, ..., K}.

The proposed system is developed in compliance with current legislation, and the methodology used to address and solve the problem follows the stages generally recognized as fundamental by the MCDA Theory, i.e., structuring, evaluation, and synthesis of the results.

Problem structuring

This phase provides the essential elements for understanding complex problems through an integrated set of levels and sublevels of criteria. It is relevant to note that Ordinance No. 323/88 explicitly defines the Level 2 criteria with their weights[4] and the Level 3 sub-criteria derived from the "Performance" criterion.

The substantial contribution of this work was the opening of the hierarchical structure in the other three levels through joint work with a team of experts. As a result of this first stage, the following structure of criteria and sub-criteria was designed.

Level 1 — Objective: To evaluate the background and the competitive examination of applicants for teaching assistant or research assistant positions based on the criteria that support the evaluation, determining an order of merit.

Level 2 - Criteria: Diplomas, Grade Point Average, Performance, Oral Class, and Interview.

Level 3 - Subcriteria:

- Performance is derived from: a) Teaching, b) Research, and c) Others.
- Oral Class: a) the applicant's demonstrated knowledge of the subject, b) how the class is organized, and c) the didactic qualities.

Level 4 - Subcriteria:

[4]Art.15°.- The minimum concepts and procedures to be evaluated by the jury shall be divided into two basic categories: I. Background and II. Opposition Test, the former being broken down as I.1. Diplomas, I.2. Grade point averages and I.3. Teaching or research performance and Other Records; and the second in II.1. Oral Class and II.2. Interview. The following scale will be applied: I.1. 0.08; I.2. 0.12; I.3. 0.20. Within the opposition test, a grade from zero to ten points on each sub-item must be used and is weighted according to the following scale: II.1. 0.40; II.2. 0.20.

- In Teaching, the following are considered: a) current position, b) length of service, c) training, d) production in teaching, and e) other teaching background.
- In Research: a) researcher category, b) accredited projects, and c) research production.
- Other background information includes: a) participation in evaluation committees, b) management activities, c) outreach activities, and d) professional activity.

Level 5 - Subcriteria: in the field of Research:

- Research production will be divided into: a) books or book chapters, b) journal publications, and c) presentations at congresses.

Level 6 - Alternatives: The set of alternatives comprises all the applicants registered to access a position through public competition; in this particular case, there are 11 applicants.

The following table summarizes the different hierarchical levels of criteria and subcriteria defined at this stage of problem structuring, which fulfill the properties recognized in the MCDA, i.e., completeness, consistency, and non-redundancy.

For this particular application, it can be seen that all criteria are to be maximized.

Table 1
Hierarchical structure

		Criteria and subcriteria
Background		C1: Diplomas
		C2: Grade Point Average
	Performance	C3: Maximum position in the subject
		C4: Length of service in the field
		C5: Training
		C6: Production in teaching
		C7: Background in other subjects
	Research	C8: Researcher category
		C9: Accredited projects
		C10: Production in research
		C11: Others
Opposition Test	Oral class	C12: Knowledge of the subject
		C13: Teaching qualities
		C14: Lesson organization
		C15: Interview

Source: created by the authors

Evaluation

This phase involves selecting an appropriate procedure to solve the problem; the proposed MCDA method is described above.

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The following table shows the matrix of evaluations [1] of each evaluator and the weights assigned by each of them to the criteria defined in the previous section.

Table 2
Response Matrix for Each Evaluator

Decision maker A															
APPL.	C_1	C_2	C_3	C_4	C_5	C_6	C_7	C_8	C_9	C_{10}	C_{11}	C_{12}	C_{13}	C_{14}	C_{15}
A	5.0	5.2	4.4	9.5	6.9	0.0	0.0	0.0	3.4	4.0	1.1	7.8	6.7	6.9	9.5
B	5.0	9.2	5.5	9.5	9.9	5.3	6.0	0.0	8.5	9.9	8.8	9.7	9.0	9.4	6.7
C	7.5	6.3	8.8	9.5	9.9	4.2	6.0	8.8	6.8	8.9	8.8	9.7	9.5	9.9	7.6
D	6.3	10.0	7.7	0.5	0.0	2.1	6.0	0.0	0.0	0.0	1.1	9.7	9.0	9.4	9.5
E	8.5	9.5	5.5	9.5	6.9	0.0	6.0	0.0	4.3	2.5	2.2	9.7	9.0	9.4	8.6
F	5.5	7.0	4.4	5.7	6.9	0.0	1.7	0.0	5.5	1.0	2.2	9.7	9.0	9.4	6.7
G	5.0	7.0	0.0	0.0	3.0	0.0	0.9	0.0	2.6	3.0	0.0	3.9	3.8	4.0	6.7
H	7.5	7.7	8.8	8.6	9.9	7.4	1.7	8.8	6.8	9.9	8.8	9.7	9.0	9.4	7.6
I	7.0	6.1	6.6	9.5	7.9	0.0	1.7	0.0	0.0	2.0	2.2	7.8	6.7	6.9	8.6
J	5.0	4.5	6.6	9.5	5.0	0.0	0.0	0.0	1.7	1.0	3.3	6.8	6.7	6.9	8.6
K	5.0	9.0	4.4	2.9	6.9	0.0	1.7	0.0	3.4	0.0	3.3	7.8	7.6	6.9	9.5
PESOS	0.08	0.12	0.03	0.04	0.02	0.02	0.01	0.01	0.01	0.01	0.02	0.20	0.14	0.06	0.20
Decision maker B															
APPL.	C_1	C_2	C_3	C_4	C_5	C_6	C_7	C_8	C_9	C_{10}	C_{11}	C_{12}	C_{13}	C_{14}	C_{15}
A	5.0	5.2	4.0	10.0	7.0	0.0	0.0	0.0	4.0	4.0	1.0	8.0	7.0	7.0	10.0
B	5.0	9.2	5.0	10.0	10.0	5.0	7.0	0.0	10.0	10.0	8.0	10.0	9.5	9.5	7.0
C	7.5	6.3	8.0	10.0	10.0	4.0	7.0	8.0	8.0	9.0	8.0	10.0	10.0	10.0	8.0
D	6.3	10.0	7.0	0.5	0.0	2.0	7.0	0.0	0.0	0.0	1.0	10.0	9.5	9.5	10.0
E	8.5	9.5	5.0	10.0	7.0	0.0	7.0	0.0	5.0	2.5	2.0	10.0	9.5	9.5	9.0
F	5.5	7.0	4.0	6.0	7.0	0.0	2.0	0.0	6.5	1.0	2.0	10.0	9.5	9.5	7.0
G	5.0	7.0	0.0	0.0	3.0	0.0	1.0	0.0	3.0	3.0	0.0	4.0	4.0	4.0	7.0
H	7.5	7.2	8.0	9.0	10.0	7.0	2.0	8.0	8.0	10.0	8.0	10.0	9.5	9.5	8.0
I	7.0	6.1	6.0	10.0	8.0	0.0	2.0	0.0	0.0	2.0	2.0	8.0	7.0	7.0	9.0
J	5.0	4.5	6.0	10.0	5.0	0.0	0.0	0.0	2.0	1.0	3.0	7.0	7.0	7.0	9.0
K	5.0	9.0	4.0	3.0	7.0	0.0	2.0	0.0	4.0	0.0	3.0	8.0	8.0	7.0	10.0
PESOS	0.08	0.12	0.03	0.04	0.03	0.02	0.01	0.01	0.01	0.01	0.02	0.22	0.15	0.03	0.20
Decision maker C															
APPL.	C_1	C_2	C_3	C_4	C_5	C_6	C_7	C_8	C_9	C_{10}	C_{11}	C_{12}	C_{13}	C_{14}	C_{15}
A	5.0	5.2	4.4	8.0	6.4	0.0	0.0	0.0	5.2	4.8	1.2	7.6	6.2	6.3	7.8
B	5.0	9.2	5.5	8.0	9.2	6.0	7.8	0.0	10.0	10.0	9.2	9.5	8.5	8.6	5.5

C	7.5	6.3	8.7	8.0	9.2	4.8	7.8	7.2	10.0	10.0	9.2	9.5	8.9	9.0	6.2
D	6.3	10.0	7.6	0.4	0.0	2.4	7.8	0.0	0.0	0.0	1.2	9.5	8.5	8.6	7.8
E	8.5	9.5	5.5	8.0	6.4	0.0	7.8	0.0	6.5	3.0	2.3	9.5	8.4	8.5	7.0
F	5.5	7.0	4.4	4.8	6.4	0.0	2.2	0.0	8.5	1.2	2.3	9.5	8.5	8.6	5.5
G	5.0	7.0	0.0	0.0	2.8	0.0	1.1	0.0	3.9	3.6	0.0	3.8	3.6	3.6	5.4
H	7.5	7.2	8.7	7.2	9.2	8.4	2.2	7.2	10.0	10.0	9.2	9.5	8.4	8.4	6.2
I	7.0	6.1	6.5	8.0	7.4	0.0	2.2	0.0	0.0	2.4	2.3	7.6	6.2	6.3	7.0
J	5.0	4.5	6.5	8.0	4.6	0.0	0.0	0.0	2.6	1.2	3.5	6.7	6.2	6.3	7.0
K	5.0	9.0	4.4	2.4	6.4	0.0	2.2	0.0	5.2	0.0	3.5	7.6	7.1	6.3	7.8
PESOS	0.08	0.12	0.04	0.03	0.03	0.02	0.014	0.019	0.015	0.014	0.02	0.21	0.12	0.070	0.20

Source: created by the authors

According to the proposed method, each decision maker obtains a ranking from their valuation matrix [1] by applying the steps detailed in [2] to [6].

In this way, each decision-maker obtains an order of preference according to the distance to the ideal:

Table 3

Applicant	Evaluator 1	Evaluator 2	Evaluator 3
A	0.105895	0.103569	0.118719
B	0.083204	0.077101	0.105419
C	0.070633	0.065268	0.093154
D	0.069469	0.070018	0.080475
E	0.051183	0.046074	0.076818
F	0.095870	0.090791	0.115249
G	0.189177	0.192549	0.201465
H	0.062870	0.058459	0.090394
I	0.097139	0.093731	0.115451
J	0.122164	0.120599	0.137579
K	0.088392	0.085467	0.102281

Synthesis

Since the problem corresponds to a group decision, there will be as many rankings as there are members of the evaluation committee. To conclude this process, a model is constructed that integrates the individual evaluations by calculating the geometric mean [8]. The result of this phase provides sufficient elements to issue a verdict that contributes to the achievement of the proposed objective. The following tables detail the results achieved, i.e., the evaluation and order assigned by each panel member and the group decision that gives rise to the panel's verdict.

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Table 4
Summary of the results obtained

Applicant	Evaluator 1	Evaluator 2	Evaluator 3	Group decision
A	0.105895	0.103569	0.118719	0.10916
B	0.083204	0.077101	0.105419	0.08775
C	0.070633	0.065268	0.093154	0.07544
D	0.069469	0.070018	0.080475	0.07314
E	0.051183	0.046074	0.076818	0.05653
F	0.095870	0.090791	0.115249	0.10006
G	0.189177	0.192549	0.201465	0.19426
H	0.062870	0.058459	0.090394	0.06926
I	0.097139	0.093731	0.115451	0.10166
J	0.122164	0.120599	0.137579	0.12654
K	0.088392	0.085467	0.102281	0.09172

Source: created by the authors

Table 5
Order of merit for verdict

Applicant	Score
E	0.056582
H	0.069259
D	0.073151
C	0.075446
B	0.087776
K	0.091763
F	0.100105
I	0.101678
A	0.109196
J	0.126555
G	0.194329

Source: created by the authors

Conclusions

This paper proposes a procedure based on a discrete multi-criteria decision method for the selection of candidates and applies it to the case of a public competition for assistant professorships at the Faculty of Economic Sciences of the National University of Córdoba.

Regarding the proposed method, it can be concluded that:

- The method works with cardinal variables and a finite number of alternatives, and there is correspondence between criteria and objectives.
- The method allows working with a large number of criteria and alternatives.
- The mathematical process it proposes is simple. It can be solved through a spreadsheet and does not require *ad hoc* software.

- Concerning group decisions, the methodology presented is intended to ensure that the deliberation process among decision-makers is carried out ex-ante on the definition of the decision process, criteria, and aspects to be considered and not ex-post on the evaluation of alternatives.
- It is important to emphasize that the model seeks to ensure that the group decision is arrived at from individual opinions, trying to represent the preferences and values of all members of the decision-making group.
- Deliberative processes seek to achieve consensus; they refine individual decisions by incorporating different points of view so that the whole group accepts them and they are not rejected individually by any of the members. Nonetheless, these processes presume a series of assumptions, such as the commitment and willingness to participate of all the members of the decision-making group, equality of strength or power, capacity for integration and communication, independence from particular interests, ethical and responsible conduct, etc., which are not always present in the same proportion among decision-makers.

The following conclusions can be inferred concerning the case presented and the results detailed in Tables 4 and 5:

- There are no significant differences between the evaluations of the different evaluators. Nevertheless, it should be noted that since 11 candidates applied and there are only 5 vacancies, minimal differences may mean access or rejection for one of the competitive positions.
- In the case of the first place in the order obtained, the three evaluators chose the same candidate (candidate E). In other words, the selection was made with full consensus (unanimously).
- In the case of the second place, candidate H was chosen in that order by evaluators 1 and 2. Evaluator 3 selected candidate D for the second place, who in the final decision appears in third place.
- The same methodology can be used to analyze the position assigned to each applicant by each evaluator with respect to the position assigned by the group decision.
- In positions 7, 8, 9, 10, and 11 of the ranking, all the evaluators agree on the candidates that should occupy these positions. This suggests that the criteria defined are quite objective and that the jury members have a similar way of evaluating.

- The other differences that arise between the evaluations of each panel member are due to the subjectivity of human beings in making an evaluation. For this reason, it is important to explain the methodology even when the differences are minimal, as in the present case.

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