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# Enhancing Basketball Player Performance Evaluation through a Hybrid CRITIC–CoCoFISo Based Decision Support System

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**ABSTRACT**

Building a sports team is a challenge for coaches. In the context of a basketball team, player performance is crucial during a match. This article presents the evaluation of the Madagascar national basketball team, allowing the performance of players to be assessed and simplifying the game strategy selected by the coach. The CRiteria Importance Through Intercriteria Correlation (CRITIC) and Combined Compromise for Ideal Solution (CoCoFISo) methods emphasise the importance of criteria for evaluating players by developing a decision-support system. Data from the 2025 Afrobasket competition were put to the test. Nine criteria were selected that correspond to the offensive, defensive**, and** physical performance of fifteen players. The weights of the criteria obtained using CRITIC illustrate their hierarchy, like a real-life situation in games. CoCoFISo successfully ranked players by placing those who performed best at the top of the ranking. The consistency of CoCoFISo's rankings was demonstrated by lambda values ranging from 0.1 to 0.9 with a progression of 0.1. The ranks obtained by the CoCoFISo method were then compared with five other multi-criteria methods, yielding Kendall correlation coefficients ranging from 0.81 to 1. This study represents the first implementation of the CRITIC-CoCoFISo methods in the sporting environment and could prove to be a useful decision-making tool for coaches.

## 1. Introduction

In sport, decisions are not based on a single indicator, but on several criteria such as physical performance, technical skills, experience, etc. This makes it a natural field for the application of multi-criteria methods. Previous studies have identified the different types of sport that apply these methods. The Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) method was used to evaluate Tennis players [1] and Athlete [2], to select best player [3,4] in particular football players [5–9], to measure swimmers' performance [10]. The Combined Compromise Solution

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(CoCoSo) method applied to select referee [11]. The preference ranking organization method for enrichment evaluations (PROMETHEE) method was used to optimise Captain Selection [12]. The VIsekriterijumsko KOmpromisno Rangiranje (VIKOR) method to select football player [13], best swimmer [14] and talent in sports [15]. Analytic Hierarchy Process (AHP) to identify Taekwondo Athlete Talent [16].

Basketball is a team sport in which a player's performance cannot be assessed based on a single statistical indicator. A player's contribution depends on several factors, such as offensive performance (points, assists), defensive performance (rebounds, steals, blocks), physical performance, tactical performance and even psychological performance. In this context, the overall evaluation of players becomes a complex problem involving several criteria that are often conflicting or of different natures. Traditional approaches to analysis are generally based on simple statistics or the subjective assessment of coaches and analysts. However, these methods can have certain limitations, particularly due to a lack of objectivity or the difficulty of combining several performance indicators simultaneously. To address this issue, multi-criteria decision-making (MCDA) methods offer a structured methodological framework for evaluating and ranking alternatives in this case, players while taking several criteria into account at the same time. Particularly in basketball, multi-criteria methods have been applied to evaluate and rank player [17,18]. Select players and sports teams [3,19–21], Analyse players and referee performance [17,22–24], recruit players [25].

Therefore, to assist the coach in selecting the team for a match, analysing the performance of the players on Madagascar's national basketball team using statistical data is interesting. In this context, the central issue of this research can be formulated as follows: How can multi-criteria decision-making methods be applied to objectively evaluate and rank Madagascar's national basketball team, considering several performance indicators simultaneously?

This issue raises questions about the selection of the most relevant criteria, the determination of their relative importance, and how multi-criteria methods can contribute to improving the reliability and transparency of the player evaluation process.

Therefore, following this introduction, the approach adopted to address this issue will be outlined briefly. Next, the results obtained and an analysis of them will be presented. Finally, a potential avenue for further research related to this study will be explored.

## 2. Methodology

### *2.1 Methodological process*

The methodological framework adopted in this study follows a structured and sequential process designed to support decision-making and ensure the reliability and transparency of the results. The process consists of several stages, ranging from the identification of evaluation criteria to the final dissemination of the research findings.

The first stage of the process involves identifying and defining the criteria that will be used to evaluate and compare the alternatives under consideration. These criteria represent the key dimensions relevant to the decision-making problem and are selected based on a comprehensive review of the scientific literature, as well as the objectives of the study.

Once the criteria are established, an appropriate methodological approach is selected to structure the evaluation process. This step involves choosing decision-making methods capable of weighting the criteria according to their relative importance and facilitating the systematic evaluation of the players. Such methods provide a structured analytical framework that allows for objective comparison and supports transparent decision-making.

The third stage consists of collecting the data required to implement the selected methods. Data is obtained from technical databases, ensuring the reliability, relevance, and completeness of the collected data is essential for the robustness of the subsequent analysis. At this stage, the data are carefully verified and organized to ensure their suitability for further processing.

Following the selection of the methods and the collection of data, a decision support system (DSS) is developed to operationalize the analytical framework. This system integrates the selected methods and provides a computational environment for implementing the decision-making procedures. The development phase includes the design of the system architecture, the implementation of the algorithms corresponding to the chosen methods, and the establishment of data-processing procedures. The DSS enables efficient processing of complex datasets and ensures the reproducibility of the analysis.

Once the decision support system has been developed, the collected data are entered into the system in accordance with the defined structure and format. This stage involves organizing the data according to the criteria and alternatives defined earlier and verifying their consistency and accuracy. Proper data entry is essential to ensure that the computational procedures produce reliable outputs.

After the data have been processed by the decision support system, the resulting outputs are extracted and analysed. These outputs include rankings, performance scores that allow for the comparison of players. The analysis focuses on interpreting these results in relation to the research objectives and identifying the most suitable player. This stage also includes sensitivity analyses to assess the stability of the results.

The final stage consists of documenting the entire research process and presenting the findings in the form of a scientific article. The aim is to communicate the research findings clearly and transparently, allowing other researchers to understand and replicate the methodology if necessary. Figure 1 summarises these steps.

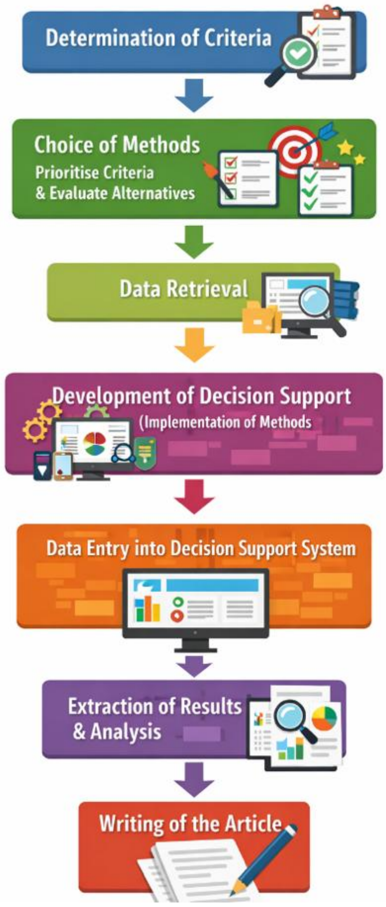



**Fig. 1.** Methodological framework

### *2.2 Choice of Methods*

The use of multi-criteria approaches requires criteria to be prioritized and alternatives to be evaluated. The choice is based for the hybrid CRiteria Importance Through Intercriteria Correlation (CRITIC) [26] method to prioritizes the criteria and the Combined Compromise For Ideal Solution (CoCoFISo) [27] method to rank the players.

These methods are used across a range of fields. In the last two years alone, the CRITIC method has been applied in the field of Computer Sciences [28,29], Social Sciences [30–33], Heath Sciences [34,35]. Similarly, the CoCoFISo method has been practice in the fields of Computer Science [36,37], Social Sciences [38,39], Physical Sciences [40].

Recently, CRITIC and CoCoFISo were used by Sah *et al.,* [41] to optimize wire electrical discharge machining. They claimed that the CoCoFISo method offered superior performance in terms of optimizing performance index values.

Therefore, this recherche will test the combination of these two methods in the field of sport. In the literature, certain applications of the CRITIC method in the sports sector [42–44] have identified but in association with other methods. However, there is no evidence of the CoCoFISo method being implemented in the sports sector in any publications, except for the one we plan to present. This article will therefore be an innovation in the application of the CRITIC-CoCoFISo method in the field of sport. The algorithms for these two methods will then be presented.

#### *2.2.1 CRiteria Importance Through Intercriteria Correlation (CRITIC)*

To prevent decision-makers from favouring one criterion over others, objective methods have been developed to determine the weightings of criteria based on the values of the alternatives for each criterion, including the CRITIC method. Therefore, this method requires the availability of a performance matrix of m alternatives and n criteria, as shown in Equation 1 below.

$$X = \begin{bmatrix} x_{11} & x_{12} & x_{13}. & . & . & x_{1n} \\ x_{21} & x_{22} & x_{23}. & . & . & x_{2n} \\ . & . & . & & & . \\ . & . & . & & & . \\ . & . & . & & & \\ x_{m1} & x_{m2} & x_{m3}. & . & . & x_{mn} \end{bmatrix} \tag{1}$$

Next, normalisation of the performance matrix using the CRITIC method is then illustrated in equation 2 below [26].

$$r_{ij} = \frac{x_{ij} - x_j^{min}}{x_j^{max} - x_j^{min}} \tag{2}$$

The calculation of the information measure is now carried out. For each criterion j, its standard deviation ($\sigma_j$) must be considered to represent both its discriminatory power, and its correlation with the other criteria ($r_{jk}$) to represent the degree of redundancy. The information conveyed by criterion j is then given by equation 3 Below.

$$C_j = \sigma_j \,.\sum_{i=1}^{m} \left(1 - r_{ij}\right) \tag{3}$$

This is how the weight of the criteria can be determined by applying equation 4 below.

$$w_j = \frac{C_j}{\sum_{j=1}^{n} C_j} \tag{4}$$

Thus, the more variable a criterion is and the weaker its correlation with the others, the greater its weight.

### *2.2.2 Combined Compromise for Ideal Solution (CoCoFISo)*

The CoCoFISo method was recently developed in 2024 to overcome the limitations of the combined compromise solution method. It combines the techniques of the Simple Additive Weighting and Exponentially Weighted Product methods to find an optimal solution. Its use requires the performance matrix mentioned above in equation 1, as well as weights assigned to the criteria, the sum of which must equal 1.

Thus, the algorithm by normalising the performance matrix is given in equation 5 below [27].

$$r_{ij} = \frac{x_{ij}}{\sqrt{\sum_{i=1}^{m}(x_{ij})^2}} \tag{5}$$

The weight of the comparability sequence below is then calculated in equation (6) and (7).

$$S_i = \sum_{j=1}^{n}\left(w_j r_{ij}\right) \tag{6}$$

$$P_i = \sum_{j=1}^{n}(r_{ij})^{w_j} \tag{7}$$

Based on these weightings, the three aggregates are calculated, allowing us to deduce the aggregation strategies from comparability sequences presented in the equations (8) to (10) below.

$$k_{ia} = \frac{P_i + S_i}{\sum_{i=1}^{m}(P_i + S_i)} \tag{8}$$

$$k_{ib} = \left(\frac{S_i + P_i}{1 + \frac{S_i}{1+S_i} + \frac{P_i}{1+P_i}}\right) \tag{9}$$

$$k_{ic} = \frac{\lambda(S_i) + (1-\lambda)(P_i)}{\left(\lambda \max_i S_i + (1-\lambda)\max_i P_i\right)} \tag{10}$$

Thus, the scores for the alternatives are determined using the equation (11) below.

$$k_i = (k_{ia} k_{ib} k_{ic})^{\frac{1}{3}} + \frac{1}{3}(k_{ia} + k_{ib} + k_{ic}) \tag{11}$$

### *2.3 Data*

The data relates to the Madagascar national team during the qualifying rounds for Afrobasket [45]. The choice of these teams follows a twofold logic. Firstly, it will allow the developed system to operate in a variety of environments, with diverse groups of people and different playing styles. Secondly, it will demonstrate how the system can be implemented within African teams participating in competitions on the continent and internationally, thereby reinforcing the external relevance and practical value of the approach. The criteria chosen to evaluate players reflect the essential aspects of individual performance in basketball, as identified in academic publications and coaching methods. These criteria were selected for their ability to illustrate the offensive, defensive and physical elements of the game in a balanced manner. These are:

i. Height: an indicator of the player's physique, influencing their role in the box and their ability to dominate physically;
ii. Points scored (PTS): a direct measure of the player's offensive contribution;
iii. Rebounds (REB): an indicator of the ability to recover the ball, essential in both offence (offensive rebounds) and defence (defensive rebounds);
iv. Assists (AST): reflect the player's vision and ability to create opportunities for teammates;
v. Minutes played (MIN): reflect the coach's confidence in the player and their consistency in the squad;
vi. 3-point shots made (3 PTS): indicator of specialisation in long-range shooting, essential in modern basketball;
vii. Field goal percentage (FG%): an overall measure of shooting efficiency;

viii. Free throw percentage (FT%): reflects the player's reliability in decisive situations;
ix. Steals (STL): reflect defensive contribution through ball recovery and disruption of the opponent's play.

There were fifteen players. Table1 shows the performance matrix used to evaluate the players.

**Table 1**
Performance matrix

| Players | Height | PTS | REB | AST | MIN | 3PT% | FG% | FT% | STL |
|---|---|---|---|---|---|---|---|---|---|
| Player 1 | 172.00 | 8.30 | 2.00 | 0.70 | 12.70 | 0.50 | 0.50 | 1.00 | 0.30 |
| Player 2 | 198.00 | 8.00 | 4.20 | 1.00 | 20.20 | 0.00 | 0.47 | 0.67 | 0.20 |
| Player 3 | 203.00 | 4.50 | 1.30 | 0.50 | 13.00 | 0.25 | 0.33 | 0.67 | 0.30 |
| Player 4 | 196.00 | 3.60 | 4.20 | 0.80 | 16.20 | 0.12 | 0.25 | 0 | 0.40 |
| Player 5 | 198.00 | 17.50 | 7.50 | 5.00 | 27.50 | 0.27 | 0.41 | 0.73 | 1.50 |
| Player 6 | 197.00 | 2.70 | 3.00 | 0 | 12.00 | 0 | 0.33 | 1.00 | 0.30 |
| Player 7 | 206.00 | 12.20 | 7.80 | 1.20 | 25.20 | 0.15 | 0.48 | 0.58 | 1.00 |
| Player 8 | 186.00 | 12.80 | 3.80 | 4.40 | 31.40 | 0.30 | 0.33 | 0.88 | 1.80 |
| Player 9 | 198.00 | 6.60 | 5.20 | 0.60 | 19.80 | 0 | 0.39 | 0.63 | 0.80 |
| Player 10 | 185.00 | 0.00 | 0.00 | 0.50 | 6.50 | 0 | 0 | 0 | 0 |
| Player 11 | 188.00 | 0.00 | 0.00 | 0.50 | 2.00 | 0 | 0 | 0 | 0 |
| Player 12 | 175.00 | 5.20 | 2.80 | 3.40 | 23.00 | 0.50 | 0.40 | 0.88 | 1.80 |
| Player 13 | 198.00 | 0 | 2.00 | 3.00 | 9.00 | 0 | 0 | 0 | 0 |
| Player 14 | 186.00 | 5.00 | 2.80 | 1.20 | 21.00 | 0.19 | 0.19 | 0.50 | 0.20 |
| Player 15 | 195.00 | 6.50 | 0.50 | 0.50 | 5.50 | 1.00 | 1.00 | 1.00 | 0 |

## 3. Results and Discussion

There are two categories of results. Initially, the weights of the criteria are determined using the CRITIC method, followed by the ranking of players based on their performance according to the CoCoFISo method. We will present each of these results.

### *3.1 Weighting of Criteria by CRITIC*

The CRITIC method determined the weights of the criteria illustrated in Table 2.

**Table 2**
Criteria weighting by CRITIC

| HEIGHT | FT% | 3PT% | AST | REB | MIN | FG% | STL | PTS |
|---|---|---|---|---|---|---|---|---|
| 0.16 | 0.14 | 0.13 | 0.12 | 0.10 | 0.09 | 0.09 | 0.09 | 0.08 |

The CRITIC method produced a result that allows the criteria to be ranked by assigning them respective weights. These weights range from 0.08 to 0.16, showing a wide disparity in terms of the importance of the criteria. In this context, the nine criteria have been classified into seven priorities. This means that there are criteria that have the same priority.

According to the analysis of result carried out using the CRITIC method, the Height criterion is particularly important compared to the others. This means that when selecting players for basketball, priority should be given to their height. The secondary priority criterion is free throw percentage (FT%), which has a weighting of 0.14. Thus, players who excel at free throws are valuable because they contribute to scoring points for their team.

Next, the three-point success rate (3PT%) criterion ranks third with a weight of 0.13. Consequently, a player who consistently makes three-point shots quickly boosts their team's score and can contribute to its victory if they can do so frequently by scoring. We observed that the second

(FT%) and third (3PT%) priority criteria have very similar weights, as each contributes significantly to the team's success. In addition, the top three criteria are interconnected, as height is an advantage for a player who excels at both free throws and three-point shots.

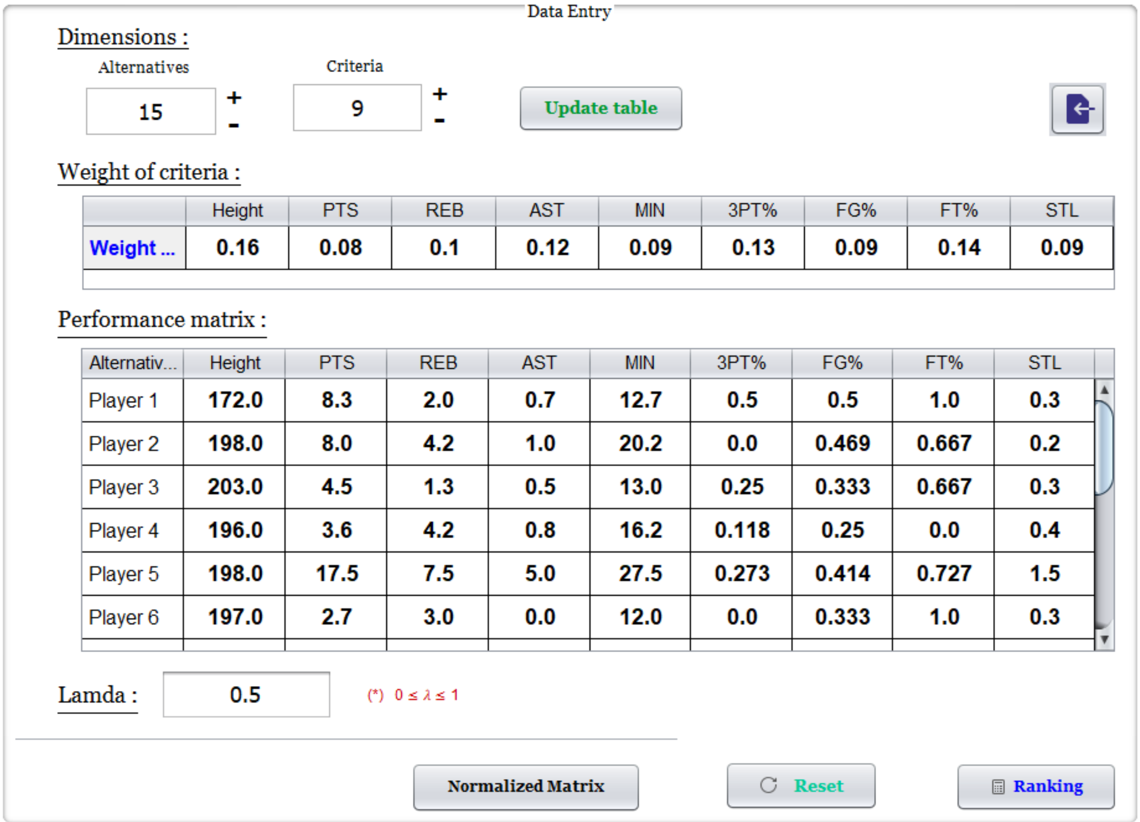
The fourth priority criterion is assists (AST), with a weighting of 0.12. A player who frequently misses passes gives their opponent an advantage and wastes time and energy for their team. This can even lead to an increase in the opponent's score. That is why assists are ranked fourth among the priority factors for evaluating the performance of basketball players. Rebounds (REB) are priories fifth among the criteria, with a weighting of 0.10. They are crucial because they serve a dual purpose: offensive and defensive. Recovering the ball, whether in your own half or in the opponent's half, can lead to points for the team.

The number of minutes played (MIN), field goal percentage (FG%) and number of steals (STL) are of equal importance, each with a coefficient of 0.09. According to the CRITIC method, these criteria rank sixth in terms of priority. They contribute to a player's performance, but compared to other criteria, they are less important. For example, a player who demonstrates endurance during a match but lacks mastery of free throws, three-point shots and assists is less attractive than others. In turn, the point scored (PTS), which is less important than the other criteria, is ranked last with a weighting of 0.08. This is because, in any given match, it represents the typical situation for a player.

These criteria weights will be considered to determine player performance.

### *3.2 Player performance by CoCoFISo*

As a decision-support system (DSS) has been designed to facilitate the ranking of these players, the DSS data import interface is shown in Figure 2.




| | Height | PTS | REB | AST | MIN | 3PT% | FG% | FT% | STL |
|---|---|---|---|---|---|---|---|---|---|
| Weight ... | 0.16 | 0.08 | 0.1 | 0.12 | 0.09 | 0.13 | 0.09 | 0.14 | 0.09 |

| Alternativ... | Height | PTS | REB | AST | MIN | 3PT% | FG% | FT% | STL |
|---|---|---|---|---|---|---|---|---|---|
| Player 1 | 172.0 | 8.3 | 2.0 | 0.7 | 12.7 | 0.5 | 0.5 | 1.0 | 0.3 |
| Player 2 | 198.0 | 8.0 | 4.2 | 1.0 | 20.2 | 0.0 | 0.469 | 0.667 | 0.2 |
| Player 3 | 203.0 | 4.5 | 1.3 | 0.5 | 13.0 | 0.25 | 0.333 | 0.667 | 0.3 |
| Player 4 | 196.0 | 3.6 | 4.2 | 0.8 | 16.2 | 0.118 | 0.25 | 0.0 | 0.4 |
| Player 5 | 198.0 | 17.5 | 7.5 | 5.0 | 27.5 | 0.273 | 0.414 | 0.727 | 1.5 |
| Player 6 | 197.0 | 2.7 | 3.0 | 0.0 | 12.0 | 0.0 | 0.333 | 1.0 | 0.3 |

**Fig 2.** Extract from data imported into DSS

Since the data is correctly integrated into the DSS, this interface allows to directly view the player rankings using the Ranking button at the bottom right. Consequently, the players' scores and rankings are shown in Table 3.

**Table 3**
Players' ranking

| Player | Score Ki | Rank |
|---|---|---|
| Player 5 | 2.3506 | 1 |
| Player 8 | 2.3356 | 2 |
| Player 12 | 2.3169 | 3 |
| Player 7 | 2.2861 | 4 |
| Player 1 | 2.2444 | 5 |
| Player 14 | 2.2002 | 6 |
| Player 3 | 2.1895 | 7 |
| Player 9 | 2.0331 | 8 |
| Player 2 | 2.0234 | 9 |
| Player 15 | 1.9990 | 10 |
| Player 4 | 1.9791 | 11 |
| Player 6 | 1.7839 | 12 |
| Player 13 | 1.0635 | 13 |
| Player 10 | 0.7649 | 14 |
| Player 11 | 0.7413 | 15 |

The player classification established according to the CoCoFISo method is now available. This ranking reflects player performance by considering the nine established criteria. This gives the coach the opportunity to select players for a specific match and apply a strategy, given that each player has their own performance characteristics. This ranking can be understood by consulting the performance matrix in Table 1, which shows the initial position of players in relation to the selected criteria. The performance of the top two players and the player placed in the last position, namely Player 5, Player 8 and Player 11 can be discussed. The extract from the performance matrix illustrating their initial status is presented in the following Table 4.

**Table 4**
Performance Matrix Extract

| Players | Rank | Height | PTS | REB | AST | MIN | 3PT% | FG% | FT% | STL |
|---|---|---|---|---|---|---|---|---|---|---|
| Player 5 | 1 | 198.00 | 17.50 | 7.50 | 5.00 | 27.50 | 0.27 | 0.41 | 0.73 | 1.50 |
| Player 8 | 2 | 186.00 | 12.80 | 3.80 | 4.40 | 31.40 | 0.30 | 0.33 | 0.88 | 1.80 |
| Player 11 | 15 | 188.00 | 0.00 | 0.00 | 0.50 | 2.00 | 0.00 | 0.00 | 0.00 | 0.00 |

Player 5 outperforms Player 8 in five of the nine criteria, namely height, assists (AST), rebounds (REB), points (PTS) and shooting percentage (FG%). It should be noted that these criteria are weighted 0.16, 0.12, 0.1, 0.09 and 0.08 respectively, representing a total of 55% of the weighting. Consequently, Player 5 performs better than Player 8 as well as other players. Although Player 11 outperforms Player 8 in terms of height, it remains weak in all other criteria, with six of them even showing a value of zero. Consequently, Player 11 performs less well than the other players.

### *3.3 Simulation Results*

However, to confirm this player ranking, the value of parameter λ in the CoCoFISo method was modified, as it is set to 0.5 by default. The result was simulated using nine different Lambda values, ranging from 0.1 to 0.9 with an increment of 0.1. The sensitivity analysis shows that varying the parameter λ between 0.1 and 0.9 does not affect the ranking of players. Scores decrease slightly as λ increases, but the differences remain small. This indicates that the model is robust with respect to the choice of parameter λ and that the results obtained are stable. Table 5 below presents this simulation.

**Table 5**
CoCoFISo *Ki* value with variation of parameter λ

| Rank | Player | Parameter λ | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 0.1 | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 |
| 1 | Player 5 | 2.3506 | 2.3506 | 2.3506 | 2.3506 | 2.3506 | 2.3506 | 2.3506 | 2.3506 | 2.3506 |
| 2 | Player 8 | 2.3371 | 2.3369 | 2.3366 | 2.3362 | 2.3356 | 2.3348 | 2.3335 | 2.3312 | 2.3258 |
| 3 | Player 12 | 2.3201 | 2.3196 | 2.3189 | 2.3181 | 2.3169 | 2.3153 | 2.3127 | 2.3079 | 2.2968 |
| 4 | Player 7 | 2.2911 | 2.2903 | 2.2893 | 2.2879 | 2.2861 | 2.2835 | 2.2793 | 2.2718 | 2.2542 |
| 5 | Player 1 | 2.2513 | 2.2502 | 2.2488 | 2.2469 | 2.2444 | 2.2407 | 2.2349 | 2.2243 | 2.1994 |
| 6 | Player 14 | 2.2102 | 2.2086 | 2.2065 | 2.2039 | 2.2002 | 2.1949 | 2.1865 | 2.1713 | 2.1351 |
| 7 | Player 3 | 2.1995 | 2.1979 | 2.1958 | 2.1932 | 2.1895 | 2.1842 | 2.1758 | 2.1607 | 2.1245 |
| 8 | Player 9 | 2.0398 | 2.0387 | 2.0374 | 2.0356 | 2.0331 | 2.0296 | 2.0240 | 2.0140 | 1.9900 |
| 9 | Player 2 | 2.0304 | 2.0292 | 2.0278 | 2.0260 | 2.0234 | 2.0197 | 2.0139 | 2.0034 | 1.9877 |
| 10 | Player 15 | 2.0008 | 2.0005 | 2.0001 | 1.9997 | 1.9990 | 1.9981 | 1.9966 | 1.9939 | 1.9785 |
| 11 | Player 4 | 1.9886 | 1.9870 | 1.9851 | 1.9826 | 1.9791 | 1.9741 | 1.9661 | 1.9517 | 1.9174 |
| 12 | Player 6 | 1.7904 | 1.7894 | 1.7880 | 1.7863 | 1.7839 | 1.7804 | 1.7749 | 1.7650 | 1.7413 |
| 13 | Player 13 | 1.0663 | 1.0658 | 1.0653 | 1.0645 | 1.0635 | 1.0620 | 1.0597 | 1.0556 | 1.0457 |
| 14 | Player 10 | 0.7682 | 0.7677 | 0.7670 | 0.7661 | 0.7649 | 0.7632 | 0.7605 | 0.7556 | 0.7439 |
| 15 | Player 11 | 0.7446 | 0.7441 | 0.7434 | 0.7425 | 0.7413 | 0.7395 | 0.7367 | 0.7317 | 0.7197 |

To further the discussion, the ranking obtained using the CoCoFISo method were compared with those generated by the Weight Sum Model (WSM), Weight Product Model (WPM), TOPSIS, MARCOS and FUCA methods, using the same performance matrix and criteria weights. The variation in player rankings according to these methods is illustrated in Figure 3.

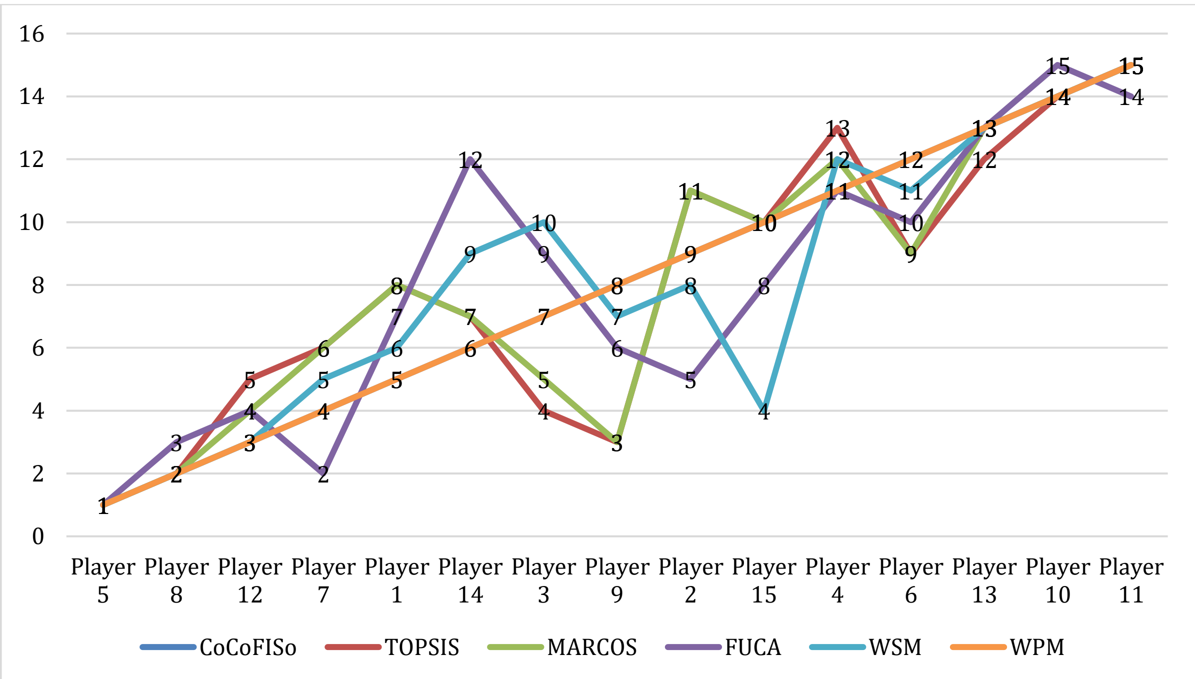



**Fig 3.** Comparison of CoCoFISo rankings with WSM, WPM, TOPSIS, MARCOS and FUCA

The comparative analysis of rankings indicates that CoCoFISo exhibits a generally consistent trend with the other MCDM methods, while showing some local deviations depending on the evaluated alternatives. A strong alignment is observed between CoCoFISo, WPM, and WSM, as their ranking curves follow very similar patterns across most alternatives. This confirms the high correlation values previously identified and highlights a strong consensus among these methods. CoCoFISo and WPM display nearly identical ranking behaviour, reinforcing their perfect correlation and suggesting that both methods produce equivalent decision outcomes in this case. Additionally, toward the higher-ranked Players, all methods including CoCoFISo converge to similar ranking positions (approximately 13–15), indicating a clear agreement in identifying the best-performing Players.

Despite the overall agreement, some discrepancies are noticeable. TOPSIS shows more pronounced variations compared to CoCoFISo, especially for mid-ranked alternatives. This can be attributed to its reliance on distance from ideal and anti-ideal solutions. MARCOS exhibits occasional deviations, reflecting differences in its utility-based evaluation mechanism. FUCA presents the most significant fluctuations, indicating a comparatively lower level of agreement with CoCoFISo and a higher sensitivity to input criteria.

Overall, CoCoFISo can be considered a stable and representative method, characterized by strong agreement with WPM (almost identical rankings), high consistency with WSM, general alignment with TOPSIS and MARCOS, moderate divergence from FUCA. These findings suggest that while most MCDM methods produce comparable results, methodological differences can influence rankings at a local level, particularly for intermediate alternatives.

Kendall's correlation coefficients were calculated to determine the direction of correlation between the CoCoFISo method and the other methods. Figure 4 provides these coefficients.

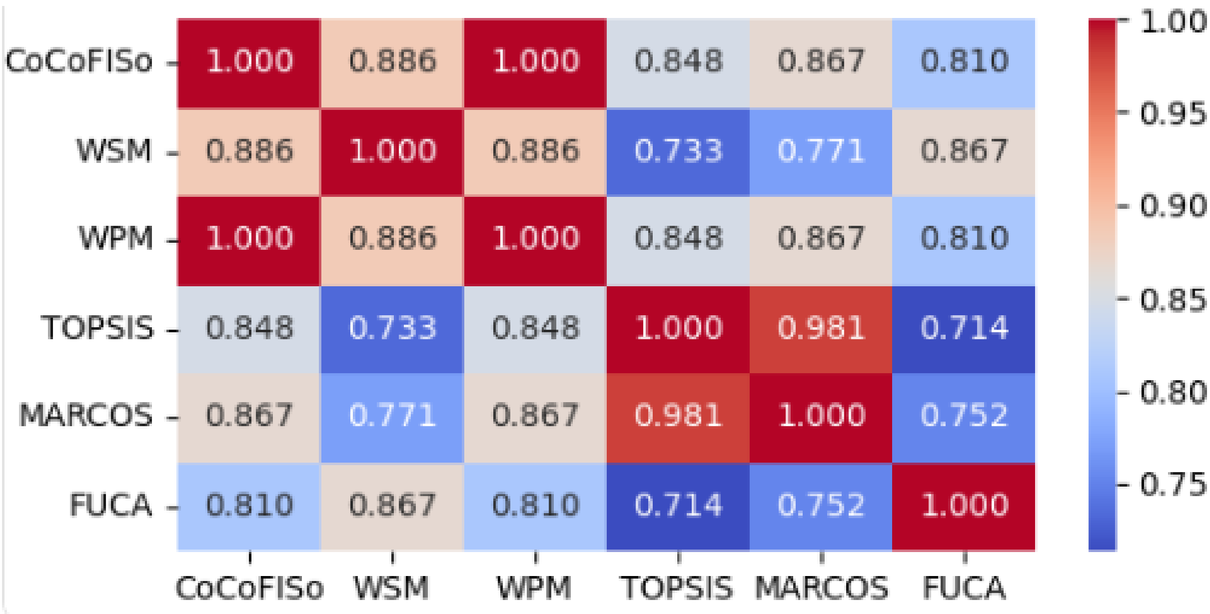



**Fig. 4.** Kendall's correlation coefficients

The analysis of the correlation matrix indicates that the CoCoFISo method exhibits a high level of consistency with the other MCDM methods. The correlation between CoCoFISo and WPM is perfect (1.000), indicating that both methods produce identical rankings of the alternatives. This suggests a functional equivalence within the studied context. A very strong correlation is observed between CoCoFISo and WSM (0.886), reflecting a high degree of similarity in the results, although minor differences in ranking still exist. The correlations with TOPSIS (0.848) and MARCOS (0.867) remain high, confirming that CoCoFISo is generally consistent with methods based on different evaluation principles (distance to the ideal solution for TOPSIS and utility ratio for MARCOS). This further supports the robustness of CoCoFISo. The lowest correlation is observed with FUCA (0.810). Although still relatively high, this value indicates that FUCA introduces greater variability in the rankings, likely due to differences in its aggregation or weighting mechanisms.

## 4. Conclusion

For the first time in the sports sector, this research facilitated the integration of CRITIC and CoCoFISo methods. The intention is to evaluate player performance in basketball. The case of the Madagascar national basketball team was examined. The information relates to the qualification of African national teams for Afrobasket 2025. Nine elements of player performance were considered, and fifteen of them were evaluated. The CRITIC method assigned weights to the criteria between 0.09 to 0.16 in a realistic manner, compared to the strategy used in basketball. The ranking of players using the CoCoFISo method was achieved through the development of a decision support system. The system developed can be used for any team and sports category. The ranking obtained showed that the player in first place deserves it, given that he performs better than the other players. The parameter λ simulation for the CoCoFISo method revealed that the rankings obtained are robust and consistent. The use of other multi-criteria methods such as WSM, WPM, TOPSIS, MARCOS and FUCA compared to the CoCoFISo method for ranking reveals disparities in the rankings, except for the player at the top of the ranking and those of the WPM method. However, the Kendall correlation coefficients obtained by the CoCoFISo method for these five methods show that they have a similar correlation.

CoCoFISo emerges as a robust and representative MCDM method, demonstrating strong agreement with established techniques while maintaining consistency across multiple validation approaches. The combined use of correlation analysis and ranking comparison provides a solid basis for validating decision-making results and enhances the methodological rigor of the study.

This is a successful experiment for the CRITIC-CoCoFISo hybrid methods in the field of sports. This research represents an innovation in the application of the CoCoFISo method within the sports sector. It is hoped that this article will address a gap in the use of the CoCoFISo method in the sports field. From a practical perspective, it may assist in formulating strategies within professional leagues.

This research can serve as a support tool for coaches in selecting their players, allowing them to evaluate their performance.

However, this only applies to the Madagascar national basketball team during Afrobasket 2025 (Africa Cup of Nations). It is relevant to examine the performance of these players by considering statistics from other tournaments, given that a player's performance can vary from one competition to another. Another interesting study is to compare this team's performance with that of other African teams to develop a strategy for facing the opponent.

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**Conflicts of Interest**

Authors declare no conflicts of interest.

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