Talent Selection in Sport with Multi-Criteria Decision-Making Methods: TOPSIS and VIKOR Comparison

Çok Kriterli Karar Verme Yöntemleri ile Sporda Yetenek Seçimi: TOPSIS ve VIKOR Karşılaştırması

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Abstract: Multi-criteria decision-making (MCDM) methods refer to a successful system used in various fields. Developed to facilitate the decision-maker's task, this system employs qualitative and quantitative methods by weighting criteria in a setting with a large number of alternatives. Similarly, the talent selection process in sports is based on making a decision by interpreting the different skills of many athletes in accordance with the appropriate discipline. However, during this process, errors can occur in preferences due to overlooked minor details or when athletes cannot have the opportunity to present themselves. MCDM methods provide an opportunity in this regard by blending athletes' quantitative data with their qualitative values in order to minimize errors. Thus, in this study, TOPSIS and VIKOR among MCDM methods were applied to the same athletes' data by using common criteria weights, and athletes were ranked from the best to the worst option. While TOPSIS method ranking has the score distribution between 0.731 and 0.116, VIKOR method has the score distribution between 0.091 (closest to 0) and 0.488 (closest to 1). While there was a 10% exact match between the two methods, it was observed that three alternatives (B, G, and F) changed places (B,G,F) by 3 ranks and other three alternatives (C, D, and J) by 2 ranks. The results of the ranking revealed differences in the rankings of the two methods, but the most significant discrepancies were observed in the middle ranges.

Keywords: Multi-criteria decision-making, TOPSIS, VIKOR, talent selection.

Özet: *Çok kriterli karar verme (ÇKKV) yöntemleri birçok alanda kullanılan ve başarılı sonuçlar veren bir sistemdir. Karar vericinin işini kolaylaştırmak üzere geliştirilen bu sistem çok sayıda alternatifin olduğu bir düzende kriterleri ağırlıklandırarak nitel ve nicel yöntemlerden destek alır. Sporda yetenek seçimi süreci de benzer şekilde birçok sporcunun farklı becerilerini uygun olan branşa göre yorumlayıp karar verme üzerine kurulmuştur. Ancak bunu yaparken gözden kaçabilecek küçük detaylar ya da sporcunun kendini gösterebilme fırsatını yakalayamaması durumunda tercihlerde hatalar yapılabilmektedir. ÇKKV yöntemleri bu noktada sporcuların sayısal verilerini nitel değerlerle harmanlayarak hatayı en aza indirebilme adına bir fırsattır. Buradan yola çıkarak bu çalışmada ÇKKV yöntemlerinden TOPSIS ve VIKOR metotları aynı sporcu verileri üzerinde ortak kriter ağırlıkları kullanılarak uygulanmış ve sporcular en iyi seçenekten en kötü seçeneğe göre sıralanmıştır. TOPSIS metodu sıralaması 0,731 ile 0,116 arasında skor dağılımına sahipken VIKOR metodu sıralaması 0'a en yakın 0,091 ile 1'e en yakın 0,488 arasında dağılmıştır. İki metot arasında %10'luk tam bir eşleşme söz konusuyken üç alternatifin (B,G,F) 3 sıra, diğer üç alternatifin ise (C,D,J) 2 sıra yer değiştirdiği gözlenmiştir. Sıralama sonucunda iki yöntemin de sıralamalarında farklılıklar olduğu ancak en yoğun farklılığın orta bölgelerde olduğu görülmüştür.*

Anahtar Kelimeler: *Çok kriterli karar verme, TOPSIS, VIKOR, yetenek seçimi.*

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INTRODUCTION

Sports is a field, in which countries compete to gain prestige and achieve success on the international stage. Talented athletes are necessary to be successful in this field. The early identification of sportive talent and orienting the athlete to the most suitable discipline are necessary for optimal success. Although some studies suggested that early talent selection might not be sufficient, this method is employed in many sports disciplines in order to achieve progress. It should be noted that discipline-specific talents are important in talent identification and these physical characteristics must be measured at early ages (Esen and Uslu, 2020).

Multi-criteria decision-making methods that are suitable for cases such as talent identification in sports were designed to support decision-makers in making better selections for solving complex problems having various aspects. These methods assist in solving complex problems by listing and proposing the most suitable solution alternatives from a randomly generated set of alternatives based on simple and specific criteria (Esen and Uslu, 2020).

When a decision-making problem involves only a single criterion, individuals can make decisions easily in accordance with that criterion. However, decision-making problems encountered in daily life mostly incorporate multiple conflicting and complex criteria. As the number of criteria increases, the processes required for decision-making also increase, which makes the decision-making process more challenging (Cengiz, 2012).

Multi-criteria decision-making (MCDM) methods were developed in the 1960s in order to simplify the decision-making process when dealing with numerous criteria.

Multi-criteria decision-making, which is crucial in managerial tasks where the human factor plays a significant role, cannot be performed solely by using tools, techniques, or algorithms. In these methods, a small number of alternatives are selected from a large pool of alternatives, and criteria related to the problem are identified. If the criteria are expressed in different scales, then it is necessary to eliminate these scale differences (Cengiz, 2012).

Multiple decision-making methods can be used in order to achieve the desired objective through MCDM methods (Öztel, 2016). The selection of the method to be used is a process, which is determined by the decision-maker and requires accurate selection. At this point, the structure and process of the problem should be paid attention and the method selection should be conducted accordingly (Ersöz and Kabak, 2010). MCDM methods are categorized into three main groups in the literature. "Choice Problems" and "Classification Problems" methods, aiming to make the best selection and classification among the alternatives include AHP, ANP, MAUT/UTA, MACBETH, PROMETHEE, ELECTRE I, and TOPSIS, whereas "Ranking Problems" aiming to rank the alternatives include AHPSoft, UTADIS, FlowSort, and ELECTRE-Tri. Besides them, also the methods such as CRITIC, DEMATEL, MULTI-MOORA, ORESTE, SWARA, VIKOR, and WASPAS are also included in MCDM methods in the literature (Dalbudak and Rençber, 2022).

The advantages of multicriteria decision-making methods are as follows:

- Provides a common ground for the decision-making process in situations involving multiple and conflicting criteria.
- Can analyze large volumes of data sets and evaluate quantitative and qualitative criteria at the same time.
- Systematically conducts the decision-making process and assists in understanding complex issues.
- The disadvantages of multicriteria decision-making methods are as follows:
- There can be an issue of comparability among alternatives. In cases where an alternative is better than another alternative according to one criterion but worse according to another one, additional information might be necessary in order to determine which alternative will be preferred. Since this information is based on the decision maker's preferences, an additional modeling reflecting these preferences is necessary.
- In many decision problems, situations where one alternative is superior to other alternatives in all criteria are rarely observed. Therefore, problems cannot be precisely defined mathematically. Only compromise solutions can be found because they cannot be identified precisely. The best-compromise solutions are subjective and they depend on the decision maker (Timor, 2011).

TOPSIS

Developed by Hwang and Yoon (1981), TOPSIS (Technique for Order Preference by Similarity to Ideal Solution) is a robust and reliable decision-making technique that proposes a solution by determining the solution option that is closest to the ideal (the best) solution while being farthest from the negative ideal solution based on given data (Yoon, 1987; Lai, Liu, and Hwang, 1994; Opricovic and Tzeng, 2004; Wei, 2010; Monjezi et al., 2010). Hwang and Yoon (1981) formulated this method based on the assumption that the solution point would be closest to the positive ideal solution and farthest from the negative ideal solution. The method assumes that the alternative that is closest to the ideal solution is also farthest from the negative ideal solution (Chen, 2000).

This method identifies a solution that is closest to the ideal solution and farthest from the negative ideal solution by using the Euclidean distance, but it doesn't take the relative importance of distances into account (Cristóbal, 2012). It assumes that distances follow a regularly increasing or decreasing benefit curve. In this method, alternatives are first ranked from top to bottom by using a decision matrix, and the values of each alternative according to the relevant criteria are entered into the matrix (Timor, 2011). TOPSIS method solves the problem by determining the criteria and alternatives according to expert opinions, calculating the criterion weights, normalizing the decision matrix to create the standard decision and weighted standard decision matrices, identifying the positive ideal and negative ideal solutions, determining the separation criteria using Euclidean distance, calculating the relative proximity to the ideal solution, and ranking the alternatives.

TOPSIS method is applied as follows:

1. Objectives are determined and assessment criteria are identified.
2. A decision matrix must be established at this step. In this decision matrix, alternatives are horizontally listed and the characteristics exhibited by the alternatives are added against them.
3. The matrix is standardized by dividing each criterion score in decision matrix by the square root of the sum of the squares of the scores of each criterion in decision matrix.

$$Z_{ij} = \frac{y_{ij}}{\sqrt{\sum_{i=1}^{n} y_{ij}^2}} \qquad i = 1,2,\ldots.,n \quad j = 1,2,\ldots.,k$$

4. In this step, the relative weight values of criteria are calculated by multiplying the weight coefficient assigned to the criteria by the components of the normalized decision matrix. Here, the weights are determined by the subjective opinions of decision-maker.

$$X_{ij} = w_i . z_{ij} \qquad i = 1,2,\ldots.,n \quad j = 1,2,\ldots.,k$$

5. m^* and m^- ideal points are calculated.

$m^* = [x_1^*, x_2^*, \ldots\ldots\ldots x_k^*]$ (maximum values)
$m^- = [x_1^-, x_2^-, \ldots\ldots\ldots x_n^-]$ (minimum values)

6. Then, the distance to maximum ideal points is calculated.

$$S_i^* = \sqrt{\sum_{j=1}^{k} (x_{ij} - x_j^*)} \quad i = 1,2,\ldots.,n$$

7. Then, the distance to minimum ideal point is calculated.

$$S_i^- = \sqrt{\sum_{j=1}^{k} (x_{ij} - x_j^-)} \qquad i = 1,2,\ldots.,n$$

8. In the final step of calculation, alternatives are ranked relatively and their scores are calculated as follows:

$$C_i^* = \frac{S_1^-}{S_i^- + S_i^*} \qquad 0 \le C_i^* \le 1 \qquad i = 1,2,\ldots.,n$$

C_i^* values are ranked from top to bottom and alternatives are listed (Monjezi et al., 2010).

VIKOR

The VIKOR method aims to find a compromise solution that is closest to the ideal solution, taking alternatives and evaluation criteria into account. This compromise solution is determined as the solution with the least deviation from the ideal solution (Opricovic and Tzeng, 2004). The concept of a compromise solution refers to selecting the alternative closest to the ideal solution by creating a multi-criteria ranking index for alternatives and under specific conditions. Assuming that each alternative is assessed by using the decision-making criteria, proximity values to the ideal alternative are compare and the compromise ranking is achieved (Opricovic and Tzeng, 2007). This method also considers the effect of the decision-maker group on the outcome. It is ensured that the group benefit is maximized and consequently the opposite opinions' regret is minimized (Uğur, 2017; Yıldırım and Önder, 2017).

VIKOR methods can be explained as follows:

1. The best (f_i^*) and the worst (f_i^-) values are determined for each criterion. In this formula, if the criterion i refers to benefit, then (f_i^*) and (f_i^-) values for $i = 1,2,3, \ldots .. n$ are expressed as seen in Equation 1:

Equation 1:

$f_i^* = max_j f_{ij}$ and $f_i^- = min_j f_{ij}$

2. S_j and R_j values are calculated for each alternative. Here, w_i refers to the criterion weights.

Equation 2:

$$S_j = \sum_{i=1}^{n} \frac{w_i(f_i^* - f_{ij})}{f_i^* - f_i^-}$$

Equation 3:

$$R_j = max\left[\frac{w_i(f_i^* - f_{ij})}{f_i^* - f_i^-}\right]$$

3. As seen in Equation 4, Q_j values were calculated separately for each alternative or assessment units.

Equation 4: $Q_j = \frac{v(S_j - S^*)}{S^- - S^*} + (1 - v)(R_j - R^*)/(R^- - R^*)$

Equation 4'te $S^* = min_j S_j$, $S^- = max_j S_j$, $R^* = min_j R_j$ and $R^- = max_j R_j$. In strategy selection, the importance of achieving the maximum group benefit is represented by v and the importance of minimizing the regret of those having opposite opinions is represented by $(1 - v)$. In general, v is calculated to be 0.5.

4. $Q_j, S_j, and\ R_j$ values calculated are ranked. Q_j alternative having the lowest value is set to be the best option in the group.
5. To determine the best alternative with the minimum Q value, two conditions must be met.

Condition 1 (Acceptable advantage): The best option is better than the option that is closest to the best.

Equation 5: $Q(P_2) - Q(P_1) \geq D(Q)$

$D(Q) = 1/(j - 1)$

In Equation 5, P_1 is the alternative having the lowest Q value, whereas P_2 is the alternative that is closest to it. The j used in calculating $D(Q)$ refers to the number of alternatives.

Condition 2 (Acceptable stability): to determine if the compromise solution is stable or not, the following two conditions must be met: P_1 alternative must have the best Q value and the highest score in at least one of S and R values. If one of these two conditions is not met, then the compromise solution cluster is presented as follows:

- P_1 and P_2 alternatives are considered in equation if Condition 2 is not met,
- P_1, P_2, ……, P_M alternatives are considered in equation if Condition 1 is not met:

$Q(P_M) - Q(P_1) < D(Q)$

The alternatives in compromise solution cluster are ranked by Q values. The best option is one of the alternatives having the lowest Q values (Yıldırım and Önder, 2017).

METHODS

TOPSIS Application: In this section of the study, the physical measurements of a group of 10 athletes will be included in the calculations. The data to be included in the calculation of the sample group consists of hand grip, flamingo balance test, touching the discs, sit and reach, sit-up, standing long jump, and 10x5 agility tests. In these tests, high scores for hand grip, sit and reach, sit-up, and standing long jump, and low scores for flamingo balance test, touching the discs, and 10x5 agility will be benefit values and they will be evaluated in calculations accordingly.

The test scores for the group of athletes are presented in Table 1 below. According to the terminology of the methods applied, the athlete group constitutes the alternatives and tests scores constitute the criteria.

Table 1: Test scores of athlete group

Athlete	Hand Grip	Flamingo	Disk	Sit-Reach	Sit-Up	SLJ	10X5
A	16.70	15.00	124.00	30.00	10.00	1.54	22.25
B	17.60	5.00	143.00	16.00	12.00	1.36	23.11
C	17.40	12.00	184.00	35.00	20.00	1.37	23.92
D	16.60	15.00	158.00	31.00	11.00	1.33	24.79
E	19.40	15.00	210.00	21.00	0.00	0.96	27.62
F	19.30	10.00	168.00	21.00	7.00	1.36	23.08
G	11.80	4.00	154.00	17.00	6.00	1.30	20.65
H	17.20	10.00	145.00	29.00	16.00	1.53	20.15
I	18.10	9.00	120.00	24.00	14.00	1.32	21.12
J	17.20	15.00	157.00	20.00	16.00	1.03	24.19

Various methods are used in weighing the criteria. In the present study, the subjective opinions of decision-maker were considered and the weights are presented in Table 2:

Table 2: Criterion weights

Weights	0.05	0.15	0.05	0.15	0.15	0.15	0.30

The calculation begins with the normalization of the matrix. The values are standardized by using the formula given in the 3rd step of this method.

Table 3: Normalized matrix table

Athlete	Hand Grip	Flamingo	Disk	Sit-Reach	Sit-Up	SLJ	10X5
A	0.306	0.275	2.274	0.550	0.183	0.028	0.408
B	0.323	0.092	2.622	0.293	0.220	0.025	0.424
C	0.319	0.220	3.374	0.642	0.367	0.025	0.439
D	0.304	0.275	2.897	0.568	0.202	0.024	0.455
E	0.356	0.275	3.851	0.385	0.000	0.018	0.506
F	0.354	0.183	3.080	0.385	0.128	0.025	0.423
G	0.216	0.073	2.824	0.312	0.110	0.024	0.379
H	0.315	0.183	2.659	0.532	0.293	0.028	0.369
I	0.332	0.165	2.200	0.440	0.257	0.024	0.387
J	0.315	0.275	2.879	0.367	0.293	0.019	0.444

After normalization and standardization, Table is multiplied by the criterion weights in Table 2 and the new values are recorded.

In Table 4, the benefit and n-benefit values refer to the scores, in which higher scores have higher values, and the scores, in which lower scores have lower values, respectively. They were applied reversely in calculations of m^* and m^-.

Table 4: Multiplication of normalized values by criterion weights

	benefit	n-benefit	n-benefit	benefit	benefit	benefit	n-benefit
Athlete	Hand Grip	Flamingo	Disk	Sit-Reach	Sit-Up	SLJ	10X5
A	0.0153	0.0413	0.1137	0.0825	0.0275	0.0042	0.1224
B	0.0161	0.0138	0.1311	0.0440	0.0330	0.0037	0.1271
C	0.0160	0.0330	0.1687	0.0963	0.0550	0.0038	0.1316
D	0.0152	0.0413	0.1449	0.0853	0.0303	0.0037	0.1364
E	0.0178	0.0413	0.1925	0.0578	0.0000	0.0026	0.1519
F	0.0177	0.0275	0.1540	0.0578	0.0193	0.0037	0.1269
G	0.0108	0.0110	0.1412	0.0468	0.0165	0.0036	0.1136
H	0.0158	0.0275	0.1329	0.0798	0.0440	0.0042	0.1108
I	0.0166	0.0248	0.1100	0.0660	0.0385	0.0036	0.1161
J	0.0158	0.0413	0.1439	0.0550	0.0440	0.0028	0.1331

Table 5: Calculation of ideal distances

m^*	**0.018**	**0.011**	**0.110**	**0.096**	**0.055**	**0.004**	**0.111**
m^-	0.011	0.041	0.193	0.044	0.000	0.003	0.152

After calculating the ideal points, the distances to maximum S_i^* and minimum S_i^- ideal points are calculated.

Table 6: Distances to maximum and minimum ideal points

Athlete	S_i^*	S_i^-
A	0.045	0.097
B	0.063	0.079
C	0.066	0.083
D	0.059	0.072
E	0.118	0.015
F	0.072	0.054
G	0.070	0.073
H	0.035	0.093
I	0.038	0.102
J	0.066	0.069

In the final step, the relative ranking of alternatives is calculated by using the formula $C_i^* = \frac{S_1^-}{S_i^- + S_i^*}$ and the best option is determined by ranking the alternatives from top to bottom.

Table 7: Relative scores of alternatives

Athlete	C_i^*
A	0.683
B	0.558
C	0.556
D	0.547
E	0.116
F	0.427
G	0.508
H	0.729
I	0.731
J	0.511

VIKOR Application

In VIKOR, the same athlete data set as in TOPSIS was used. First, the maximum benefits to be obtained from benefit and n-benefit are calculated. In this calculation, f_i^* value is calculated to be the maximum for benefit scores and the minimum for the n-benefit scores. Similarly, while calculating f_i^-, benefit scores are calculated as minimum and n-benefit scores are calculated as maximum.

In the next step, S_j, R_j and Q_j values are calculated by using the formulas $S_j = \sum_{i=1}^{n} \frac{w_i(f_i^* - f_{ij})}{f_i^* - f_i^-}$, $R_j = max\left[\frac{w_i(f_i^* - f_{ij})}{f_i^* - f_i^-}\right]$ and $Q_j = \frac{v(S_j - S^*)}{S^- - S^*} + (1 - v)(R_j - R^*)/(R^- - R^*)$.

Table 8: Athlete group's test scores and minimum and maximum values of the criteria

Athlete	Hand Grip	Flamingo	Disk	Sit-Reach	Sit-Up	SLJ	10X5
A	16.70	15.00	124.00	30.00	10.00	1.54	22.25
B	17.60	5.00	143.00	16.00	12.00	1.36	23.11
C	17.40	12.00	184.00	35.00	20.00	1.37	23.92
D	16.60	15.00	158.00	31.00	11.00	1.33	24.79
E	19.40	15.00	210.00	21.00	0.00	0.96	27.62
F	19.30	10.00	168.00	21.00	7.00	1.36	23.08
G	11.80	4.00	154.00	17.00	6.00	1.30	20.65
H	17.20	10.00	145.00	29.00	16.00	1.53	20.15
I	18.10	9.00	120.00	24.00	14.00	1.32	21.12
J	17.20	15.00	157.00	20.00	16.00	1.03	24.19
	benefit	***n-benefit***	***n-benefit***	***benefit***	***benefit***	***benefit***	***n-benefit***
f_i^*	19.40	4.00	120.00	35.00	20.00	1.54	20.15
f_i^-	11.80	15.00	210.00	16.00	0.00	0.96	27.62

Table 9: Calculation of S_j, R_j, and Q_j values

ATHLETE	S_j	R_j	Q_j
A	0.369	0.150	0.280
B	0.414	0.150	0.311
C	0.353	0.151	0.272
D	0.529	0.186	0.475
E	0.911	0.300	1.000
F	0.481	0.118	0.284
G	0.398	0.142	0.283
H	0.190	0.082	0.000
I	0.304	0.087	0.091
J	0.628	0.162	0.488

After the calculation using the VIKOR method, the Q_j values shown in Table 9 are ranked from lowest to highest, and the smallest value is referred to as the best option.

RESULTS

In this study, TOPSIS and VIKOR among MCDM methods were applied on data of 10 athletes, and the calculations are presented in tables.

Table 10: Comparison between rankings obtained from the calculations using TOPSIS and VIKOR

Ranking	Athlete	Score	Ranking	Athlete	Score
1	I	0.731	**1**	H	0.000
2	H	0.729	**2**	I	0.091
3	A	0.683	**3**	C	0.272
4	B	0.558	**4**	A	0.280
5	C	0.556	**5**	G	0.283
6	D	0.547	**6**	F	0.284
7	J	0.511	**7**	B	0.311
8	G	0.508	**8**	D	0.475
9	F	0.427	**9**	J	0.488
10	E	0.116	**10**	E	1.000
TOPSIS			**VIKOR**		

The comparison of the two methods used is presented in Table 10. As a result of calculations, Athlete I was identified as the best option in the TOPSIS method, whereas Athlete H ranked first in the VIKOR method. The second-ranked athletes were the same in these two methods. Athlete A ranked third in the TOPSIS method and fourth in the VIKOR method. Athlete B ranked 4th in the TOPSIS method but 7th in the VIKOR method. Similar difference draws attention for the Athletes G and F, who switched positions by 3 ranks. Athlete E ranked last in both methods. It can be stated that the exact match between the two methods is approx. 10% in this case. Examining the results presented in tables, it can be stated that the ranking discrepancies are particularly pronounced in the middle portion. It is recommended to make such observations with a larger number of alternatives in future studies.

DISCUSSION

The calculations were made solely using MCDM methods and a ranking was achieved. It can be clearly seen from the calculations that these two different methods did not yield the same results. A ranking based on empirical observation would further strengthen a similar study. Thus, an additional step would be taken in determining which MCDM method can be utilized for talent selection in sports.

Examining the literature, studies in the field of sports using Multicriteria Decision-making (MCDM) methods are very limited. In their study on soccer player selection by using MCDC, Qader et al. (2017) emphasized that the TOPSIS method is an effective instrument for solving player selection problems in football. Górecka (2020) used a MCDM method to identify the most suitable sports club for sponsorship. In a study carried out on wearable sports technologies by Turgut et al. (2021), a comparison was made among the Analytic Hierarchy Process (AHP), TOPSIS, and Preference Ranking Organization Method for Enrichment Evaluations (PROMETHEE) methods and, differing from the present study, no differences were observed in the rankings. Similar findings were observed in a study conducted by Ekin and Cesur (2022) on the banking sector, where a similarity was reported for the methods.

Similarly, Gülençer (2020) stated in a study carried out on the banking sector that, wven though there were differences between the TOPSIS and VIKOR methods, a general perspective about the sector was achieved. In a study carried out by Karaatlı et al. (2014) assessing football player performances using TOPSIS and VIKOR, the results indicated that VIKOR yielded slightly more consistent results when compared to TOPSIS. Tufan and Kılıç (2019) revealed in their study on financial performance evaluation that TOPSIS and VIKOR methods yielded similar results when identifying the high-performing businesses, but they differed for the low-performing ones. Similar to the present study, another study in a different sector yielded diverse results between the two methods and the most accurate decision was left to the decisionmaker (Erol et al., 2014). In a study comparing these two methods for air conditioner selection, differences were observed; it was concluded that the TOPSIS method yielded more consistent rankings in this sector and it was recommended to increase the number of alternatives (Ertuğrul and Özçil, 2014). In a study comparing 11 publicly traded companies in the stock market by using three different methods (TOPSIS, VIKOR, ELECTRE), emphasis was placed on the high level of match at the top ranks (Yanık and Yaren, 2017). The study reporting the results closest to those reported in the present study was carried out by Künç and Yaşa (2019) comparing budget indicators of countries. In their study, authors reported that, while differences among the methods shifted significantly at the top ranks, similarities increased toward the lower ranks rankings.

Ethical Considerations: ***I****nstitutional permission was obtained for the study with the information of Fenerbahçe University, Research and Publication ethics committee Number: 2020/22, Date: 26.11.2020.*

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GENİŞLETİLMİŞ ÖZET

Çalışmanın Amacı: Çok kriterli karar verme (ÇKKV) yöntemleri başarılı sonuçlar alınan ve birçok alanda tercih edilen bir sistemdir. Bu sistem çok sayıda alternatif arasından seçim yapmak için kriterleri ağırlıklandırır ve nitel ve nicel yöntemlerden yararlanır. Sporda yetenek seçimi süreci de sporcunun farklı becerilerini uygun branşa göre gözlem yoluyla değerlendirip karar verme üzerine dayanmaktadır. Fakat bu süreçte küçük detayların atlanması ya da sporcunun kendini yeteri kadar gösterebilme imkanı bulamaması durumunda yanlış tercihler yapılabilmektedir. ÇKKV yöntemleri bu noktada sporcuların sayısal verilerini nitel değerlerle birleştirerek hatayı en düşük seviyeye getirebilme imkanı sunmaktadır. Çalışmamızın amacı da bu noktadan yola çıkarak ÇKKV yöntemlerinden TOPSIS ve VIKOR yöntemleri ile sporcuların performanslarını ortak kriter ağırlıkları kullanılarak ayrı ayrı değerlendirip bir sıralama yapmak ve sıralamalar sonucunda nasıl bir fark olduğunu tespit etmektir.

Araştırma Sorusu: ÇKKV yöntemlerinden TOPSIS ve VIKOR yöntemleri aracılığıyla sporda yetenek seçimi simülasyonunda sıralama farklı var mıdır?

Literatür Araştırması: Spor, ülkelerin uluslararası alanda prestij kazanmak ve başarı elde etmek için rekabet ettiği bir alandır. Bu başarıyı sağlamak için de yetenekli sporculara gereksinim vardır. Spor yeteneğinin erken yaşlarda tespit edilmesi ve sporcunun en uygun branşa yönlendirilmesi, optimum başarı için gereklidir. Bazı araştırmalar erken yetenek seçiminin yeterli olmadığını belirtse de birçok spor dalında bu yöntem ilerleme sağlamak için kullanılmaktadır. Yetenek tespitinde, branşa özel fiziksel özelliklerin önemli olduğu unutulmamalıdır ve bu fiziksel özelliklerin erken yaşlarda ölçülmesi zorunludur.

Spordaki yetenek tespiti gibi durumlarda kullanıma uygun olan çok kriterli karar verme (ÇKKV) yöntemleri, farklı boyutlara sahip karmaşık problemlerin çözümünde, karar vericilere daha iyi seçim yapabilmeleri için destek sağlamak üzere tasarlanmıştır. Bu yöntemler, rastgele bir alternatif kümesi içinden, basit ve belirli ölçütlere dayalı olarak, en uygun çözüm alternatiflerini sıralayarak ve önererek karmaşık problemleri çözmeye yardımcı olur. Bir karar verme probleminde sadece bir kriter varsa, kişi bu kritere uygun olarak kolayca karar alabilir ancak günlük hayatta karşılaşılan karar verme problemleri çoğunlukla birden çok ve birbirine zıt karmaşık kriterleri içerir. Kriter sayısı arttıkça, karar vermek için gereken işlemler de artar ve böylece karar verme süreci zorlaşır. ÇKKV yöntemleri, kriterin çok olduğu durumlarda karar vericinin işini ve karar vermeyi kolaylaştırmak amacıyla 1960'lı yıllarda geliştirilmeye başlanmıştır.

İnsan faktörünün önemli olduğu yönetimsel bir iş olan çok kriterli karar verme, sadece araçlar, teknikler veya algoritmalar kullanılarak gerçekleştirilemez. Bu yöntemlerde, çok sayıda alternatif içinden az sayıda alternatif seçilir ve probleme ilişkin kriterler tanımlanır. Kriterler farklı ölçeklerde ifade ediliyorsa, bu ölçek farklılıklarının ortadan kaldırılması gereklidir. ÇKKV yöntemleri aracılığıyla istenen hedefe ulaşabilmek için birden çok karar verme yöntemi kullanılabilir (Öztel, 2016). Hangi yöntemin kullanılacağı konusu ise karar vericinin belirleyeceği ve doğru seçim yapmasını gerektiren bir süreçtir. Bu noktada problemin yapısı ve sürecine dikkat edilmeli ve yöntem seçimi buna göre yapılmalıdır

Yöntem: Bu çalışmada çok kriterli karar verme yöntemlerinden TOPSIS ve VIKOR metotlarının sıralama sonuçları karşılaştırılmıştır. Çalışmanın veri seti Esen ve Uslu'nun (2020) etik kurul onayı alınmış "Futbolda Yetenek Seçiminin Analitik Hiyerarşi Süreci ve TOPSIS Yöntemi Aracılığıyla Değerlendirilmesi" başlıklı çalışmasının verilerinden rastgele seçilerek oluşturulmuştur. Veri setindeki skorlar literatürdeki TOPSIS ve VIKOR formülleri aracılığı ile hesaplanmıştır. Hesaplamalarda kullanılmak üzere kriter ağırlıkları uzman görüşleri alınarak çalışmaya dahil edilmiştir.

Sonuç ve Değerlendirme: TOPSIS metodu kullanılarak yapılan hesaplamalar sonucunda I sporcusu en iyi seçenek olarak bulunurken VIKOR metodunda H sporcusu ilk sırada yer almaktadır. Aynı sporcular karşılıklı olarak metotlar arasında 2. sırada yer almaktadır. A sporcusu TOPSIS metodunda 3. sıradayken VIKOR metodunda 4. sıradadır. B sporcusu TOPSIS metodunda 4. sırada ancak VIKOR metodunda 7. sırada yer almaktadır. Benzer farklılık G ve F sporcularında 3'er sıra yer değiştirerek görülmüştür. E sporcusu her iki metotta da en son sıradadır ve birebir eşleşmenin bu durumla birlikte %10 olduğu söylenebilir.

Yapılan hesaplamalar yalnızca ÇKKV yöntemleri kullanılarak hesaplanmış ve bir sıralama oluşturulmuştur. Hesaplamalar sonucunda iki farklı metodun aynı sonucu vermediği görülmüştür. Gözlem yoluyla yapılacak bir sıralama benzer bir çalışmayı daha da kuvvetlendirecektir. Böylelikle sporda yetenek seçimi konusunda ÇKKV yöntemlerinden hangisinin kullanılabileceği konusunda bir adım daha ileriye gidilmiş olacaktır.

Tabloya göre sıralama farklılıklarının özellikle orta kısımlarda daha belirgin olduğu söylenebilir. Daha çok sayıda alternatif ile yapılacak çalışmalarda bunun gözlenmesi önerilmektedir.