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# Comparison of World Airline Rankings with Different Criteria: Best Airline Ranking and EVAMIX Method Rank

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**ABSTRACT:-** Competition in the transportation sector is in constant rise as in all sectors today. It is crucial for airlines, which are one of the most important shareholders in the transportation sector, to be recognized and reliable in order to have a place in the market. For this reason, different companies prepare and share a world airline ranking with public each year. These rankings are prepared using different criteria and methodologies. Hence, each of these rankings differs from each other. This study considers the Best Airline Ranking prepared by Airhelp in 2018. The first 15 airlines in this ranking are re-ranked with the EVAMIX method using unused criteria and the results are compared with the Best Airline Ranking. In the conclusion of the study, it is found out that rankings changed significantly; hence, it is greatly important to determine what is desired to measure when the airlines are compared.

**Keywords:** Airline, Ranking, EVAMIX, Critic Method

## I. INTRODUCTION

It is of importance to meet the changing consumer demands, reach and serve more customers in the aviation sector as in all other sectors. For this reason, airline companies measure customer satisfaction both globally and locally and endeavor to increase customer capacity.

In the aviation sector that is rapidly developing today, the indices and scores calculated to compare companies in this sector are considered as significant tools to increase prefer ability and reputation of these companies. There are many such indices prepared around the worldwide and shared with the public.

Skytrax ranks 100 airline companies every year since 1999 with the help of questionnaires applied on flight passengers that include subjects of cabin services, ground handling services, airline, and flight products(Skytrax , 2018). With the first ranking in 1991, Airline Quality Rating (Airline Quality Rating, 2018) focused on four main areas in order to measure the performances of airlines and ranked American local airline companies with the help of multiple performance criteria in 2018. Jacdec ranks best airlines in the world since 2006 using criteria of accident/incident history, environmental factors, and airline operation risk factors(Jacdec, 2018).

While there are not many studies that rank airline companies among academic publications, there are some comparisons in literature. In their 2013 article, Wu et al. compared and ranked 26 airlines in China using binary relative evaluation model with 2008 and 2009 data(Wu, Wang, Zhang, Li, & O'Brien, 2013). Klophaus and Lordan (2018) studied airline companies in the Star Aliance, Sky Team and One World groups, and ranked these companies based on code-sharing, network, vulnerability metrics(Klophaus & Lordan, 2018). Torlak et al. (2011) compared and ranked Turkish domestic airline companies using various criteria(Torlak, Sevkli, Sanal, & Zaim, 2011).

This study examines 2018 worldwide rankings announced yearly by Airhelp. Airhelp uses results of on-time performance, service quality and claim processing measurements of world airline companies for ranking them (Airhelp, 2018). It is believed that the airline ranking by Airhelp with the criteria they determined would change when different criteria and methodologies are used. For this reason, considering different criteria,

the airline companies are ranked using the EVAMIX method which is one of the multi-criteria decision-making methods. The ranking obtained is compared with the ranking by Airhelp and the results are interpreted.

## II. METHODOLOGY

The EVAMIX method (Evaluation of Mixed Data) is one of the multi-criteria decision-making methods and its use is increasing in recent years. It is first used by Voogd (1982) and developed by Martel and Matarazzo (2005). This method is based on obtaining dominance score as a result of comparing each alternative on the other alternative on the basis of criteria in case there are both ordinal and cardinal data (Chatterjee, Mondal, & Chakraborty, 2014). The rankings are prepared with the help of dominance scores obtained. Before applying the EVAMIX method, it is required to calculate the weights. There are different methods for weight calculation in literature. This study uses the CRITIC method for calculating weights, which is explained in the next part.

### a. CRITIC Method

The CRITIC method (Criteria Importance through Inter-criteria Correlation) is one of the most common weight calculation methods used in decision-making methods and is developed by Diakoulaki et al. (1995). In this method, determination of criteria weights include both the standard deviation and the correlation of the criterion(Yalçın & Ünlü, 2018). Therefore, it is recommended to use the CRITIC method to calculate weights in such studies that involve relations among variables (Diakoulaki, Mavrotas, & Papayannakis, 1995). Jahan et al. (2012) shows the steps of obtaining weights with the CRITIC method as below (Jahan, Mustapha, Sapuan, Ismail, & Bahraminasab, 2012).

Step 1: The benefit and cost criteria in the decision-matrix formed are determined. These values are normalized as follows:

$$r_{ij} = \frac{x_{ij} - x_j^{min}}{x_j^{max} - x_j^{min}} \qquad i = 1, \dots, m\,; \quad j = 1, \dots, n \quad \text{for benefit criteria} \tag{1}$$

$$r_{ij} = \frac{x_j^{max} - x_{ij}}{x_j^{max} - x_j^{min}} \qquad i = 1, \dots, m\,; \quad j = 1, \dots, n \quad \text{for cost criteria} \tag{2}$$

Here $x_{ij}$ is the value of $i^{th}$ alternative at $j^{th}$ criterion.

Step 2: The correlation among criteria and their standard deviation are calculated.

Step 3: The CRITIC weight values are calculated using equations no. 3 and 4 with the help of the values of standard deviations and correlation.

$$C_j = \sigma_j \sum_{k=1}^{n} (1 - \rho_{jk}) \qquad j = 1, \dots, n \tag{3}$$

$$w_j = \frac{C_j}{\sum_{k=1}^{n} C_k} \qquad j = 1, \dots, n \tag{4}$$

### b. EVAMIX Method

The EVAMIX method is applied with the help of the following steps.

Step 1: Firstly, the criteria are grouped into two as qualitative and quantitative criteria. The process hereafter is the same as the process in the step 1 of the CRITIC method. First, the decision matrix is formed. The cost and benefit criteria in this matrix are determined and then normalized with the formulas numbered (1) and (2).

Step 2: Alternative pairs are formed and then compared with each other. This comparison is done through dominance scores. The dominance score for quantitative variables is calculated using equation (5), and equation (6) is for qualitative variables (Aytaç Adalı, 2016).

$$\alpha_{ii'} = \left[\sum_{j=0}\left\{w_j\, sgn\left(r_{ij} - r_{i'j}\right)\right\}^c\right]^{1/c} \quad (5)$$

and

$$sgn\left(r_{ij} - r_{i'j}\right) = \begin{cases} +1 & if\ r_{ij} > r_{i'j} \\ 0 & if\ r_{ij} = r_{i'j} \\ -1 & if\ r_{ij} < r_{i'j} \end{cases}$$

$$\gamma_{ii'} = \left[\sum_{j\epsilon c}\left\{w_j\, sgn(r_{ij} - r_{i'j})\right\}^c\right]^{1/c} \quad (6)$$

The value $w_j$ in the formula represents the weight value of j[th] criterion. c is a random scaling parameter and recommended to be assigned with 1(Andalecio, 2010).

Step 3: The dominance scores $\alpha_{ii'}$ and $\gamma_{ii'}$ calculated in the previous step have different units, hence they need to be standardized. The standardized dominance scores are obtained using equation (7) for ordinal criteria and equation (8) for cardinal criteria(Darji & Rao, 2013).

$$\delta_{ii'} = \frac{\alpha_{ii'} - \alpha^-}{\alpha^+ - \alpha^-} \quad (7)$$

$$d_{ii'} = \frac{\gamma_{ii'} - \gamma^-}{\gamma^+ - \gamma^-} \quad (8)$$

Calculated for each alternative pair in the above equations, the value $\alpha^+$ ($\alpha^-$) is the highest (lowest) ordinal dominance score, and the value $\gamma^+$ ($\gamma^-$) is the highest (lowest) cardinal dominance score.

Step 4: $w_0$ is the sum of weights of ordinal criteria and $w_c$ is the sum of weights of cardinal criteria. The overall dominance score is calculated for each alternative pair as shown in equation (9) (Chatterjee, Mondal, & Chakraborty, 2014).

$$D_{ii'} = w_0\,\delta_{ii'} + w_c\, d_{ii'} \quad (9)$$

Step 5: Appraisal score for each alternative $S_i$ is calculated with equation (10) and the alternatives are ranked based on this score. A high appraisal score indicates that the alternative is better than others.

$$S_i = \sum_{i'}\left(\frac{D_{i'i}}{D_{ii'}}\right)^{-1} \quad (10)$$

## III. IMPLEMENTATION

The 2018 list of Worldwide Rankings published annually by Airhelp ranks world airline companies based on on-time performance, quality of service and claim processing. With the help of these rankings, airline companies can compare themselves with other companies and may work on their preferability by customers. Hence, these rankings have great importance in the sector. The world airlines ranking for the year 2018 and scores calculated for the relevant airline (Statista, 2018) are given in Table 1. Air Malta and Etihad Airways which are on the list prepared by Airhelp are excluded from the alternatives list because no public data could be found on these companies while preparing the criteria. The criteria used in the ranking by Airhelp are certainly quite significant. However, with the idea that using different criteria would also change the ranking of companies, this study evaluated different criteria for airline companies and ranked them with the EVAMIX method. The criteria used in this research are given in Table 1.

**Table 1. Variables used in the Research and Alternatives Ranking within Best Airlines Scores**

| Alternative No | Airlines | | | Criteria | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Airline Score (2018) | Rank | C1 Average price per passenger | C2 Number of people | C3 Retail Value | C4 Fleet | C5 Ordered Plane Number | C6 Average Age of Fleet |
| **A1** | Aegean Airlines | 8,19 | 6 | 3,133 | 6,095 | 8,000 | 49 | 30 | 10 |
| **A2** | Austrian Airlines | 8,29 | 5 | 5,539 | 7,181 | 2,826 | 83 | 0 | 15 |
| **A3** | Flybe | 7,94 | 12 | 6,745 | 4,935 | 40,909 | 77 | 4 | 10 |
| **A4** | KLM Royal Dutch Airlines | 8,01 | 9 | 3,827 | 6,043 | -0,732 | 117 | 7 | 11 |
| **A5** | Lufthansa | 8,57 | 2 | 1,416 | 3,990 | 1,277 | 280 | 167 | 12 |
| **A6** | Norwegian | 8 | 10 | 3,792 | 28,591 | 3,178 | 157 | 214 | 4 |
| **A7** | Qantas | 8,12 | 7 | 6,548 | 1,109 | 0,000 | 132 | 14 | 11 |
| **A8** | Qatar Airways | 9,08 | 1 | 7,305 | 15,808 | 6,832 | 225 | 245 | 6 |
| **A9** | Singapore Airlines | 8,33 | 3 | 0,063 | 2,694 | -1,935 | 118 | 100 | 7 |
| **A10** | South African Airways | 8,31 | 4 | -13,274 | 0,829 | -22,35 | 50 | 0 | 11 |
| **A11** | Turkish Airlines | 7,94 | 13 | 4,933 | 9,817 | 0,239 | 299 | 213 | 8 |
| **A12** | Virgin Atlantic | 8,04 | 8 | 2,670 | -0,332 | -5,882 | 44 | 18 | 10 |
| **A13** | Wizz Air | 7,95 | 11 | 6,444 | 10,431 | 2,331 | 97 | 264 | 5 |

The variables used in ranking the airline companies are obtained from Euromonitor and the corporate websites of relevant airline companies. These variables can be explained as follows:

Average Price per Passenger (US$): It is the average price the passengers pay to fly with the airline company. The price unit is selected as US Dollar for this study. This variable is edited in order to exhibit the average increase in price of the airline companies considering the years 2017 and 2018.

Number of People: It is the number of passengers in domestic and international flights without taking into account transit passengers. This variable is formed by calculating the increase considering the number of passengers for the years 2017 and 2018.

Retail Value: It shows the increase in the retail value of the airline company between the years 2017 and 2018.

Fleet: It shows the number of fleets of the airline company.

Ordered Plane Number: It is the number of airplanes that are included in the order process of airline companies as of 11.30.2018.

Average Age of Fleet: It shows the average age of fleet of the airline company as of 11.30.2018.

In the study, the airline companies will be referred to as alternatives, and the variables used for comparison will be referred to as criteria. After creating the decision making matrix, which includes values of criteria of alternatives, a normalized version of this decision matrix, is calculated in order to remove the effect of units. In forming this matrix, it is important to pay attention to that criteria should be either benefit or cost criteria.The study is conducted with the determination that fleet age is a cost, and remaining variables are benefit variables. Based on this, the normalized decision matrix is formed using equation (1) and (2) and given in Table 2.

**Table 2. Normalized Decision Matrix**

| Alternative | C1 | C2 | C3 | C4 | C5 | C6 |
|---|---|---|---|---|---|---|
| **A1** | 0,797 | 0,222 | 0,480 | 0,020 | 0,114 | 0,411 |
| **A2** | 0,914 | 0,260 | 0,398 | 0,153 | 0,000 | 0,000 |
| **A3** | 0,973 | 0,182 | 1,000 | 0,129 | 0,015 | 0,449 |
| **A4** | 0,831 | 0,220 | 0,342 | 0,286 | 0,027 | 0,318 |
| **A5** | 0,714 | 0,149 | 0,373 | 0,925 | 0,633 | 0,252 |
| **A6** | 0,829 | 1,000 | 0,404 | 0,443 | 0,811 | 1,000 |
| **A7** | 0,963 | 0,050 | 0,353 | 0,345 | 0,053 | 0,374 |
| **A8** | 1,000 | 0,558 | 0,461 | 0,710 | 0,928 | 0,813 |
| **A9** | 0,648 | 0,105 | 0,323 | 0,290 | 0,379 | 0,720 |
| **A10** | 0,000 | 0,040 | 0,000 | 0,024 | 0,000 | 0,318 |
| **A11** | 0,885 | 0,351 | 0,357 | 1,000 | 0,807 | 0,654 |
| **A12** | 0,775 | 0,000 | 0,260 | 0,000 | 0,068 | 0,467 |
| **A13** | 0,958 | 0,372 | 0,390 | 0,208 | 1,000 | 0,888 |

In the next step, the correlation and standard deviations among criteria are calculated. It was stated that this study will calculate weights with the CRITIC method in order to apply the EVAMIX method. Weights of criteria are calculated using equations 3 and 4 and shown in Table 3.

**Table 3. Objective Weight of Criteria**

| Criteria | C1 | C2 | C3 | C4 | C5 | C6 |
|---|---|---|---|---|---|---|
| $C_j$ | 0,845 | 0,764 | 0,888 | 1,169 | 1,052 | 0,867 |
| $w_j$ | 0,151 | 0,137 | 0,159 | 0,209 | 0,188 | 0,155 |

The weights obtained will be used to rank companies. However, it is first required to compare alternative pairs in this process of applying the EVAMIX method. To this purpose, the dominance scores will be calculated using either equation 5 or equation 6 depending on whether the criteria are qualitative or quantitative. However, the values calculated need to be compatible and hence need to be standardized. Using equation 7 for ordinal criteria and equation 8 for cardinal criteria, the dominance scores are calculated and presented in Table 4.

**Table 4. Standardized Dominance Scores of Alternative Pairs**

| Pairs | $\delta_{ii'}$ | $d_{ii'}$ | Pairs | $\delta_{ii'}$ | $d_{ii'}$ | Pairs | $\delta_{ii'}$ | $d_{ii'}$ |
|---|---|---|---|---|---|---|---|---|
| (1,2) | 0,4738 | 0,5633 | (5,6) | 0,526 | 0,202 | (9,10) | 1,000 | 0,758 |
| (1,3) | 0,4738 | 0,3716 | (5,7) | 1,000 | 0,453 | (9,11) | 0,000 | 0,424 |
| (1,4) | 0,4738 | 0,5370 | (5,8) | 0,526 | 0,265 | (9,12) | 1,000 | 0,552 |
| (1,5) | 0,0000 | 0,5751 | (5,9) | 1,000 | 0,443 | (9,13) | 0,526 | 0,359 |
| (1,6) | 0,0000 | 0,2768 | (5,10) | 1,000 | 0,702 | (10,1) | 0,526 | 0,223 |
| (1,7) | 0,4738 | 0,5286 | (5,11) | 0,000 | 0,367 | (10,2) | 0,237 | 0,286 |
| (1,8) | 0,0000 | 0,3406 | (5,12) | 1,000 | 0,495 | (10,3) | 0,000 | 0,095 |
| (1,9) | 0,0000 | 0,5185 | (5,13) | 0,526 | 0,302 | (10,4) | 0,000 | 0,260 |
| (1,10) | 0,4738 | 0,7768 | (6,1) | 1,000 | 0,723 | (10,5) | 0,000 | 0,298 |
| (1,11) | 0,0000 | 0,4426 | (6,2) | 1,000 | 0,786 | (10,6) | 0,000 | 0,000 |
| (1,12) | 1,0000 | 0,5703 | (6,3) | 1,000 | 0,595 | (10,7) | 0,000 | 0,252 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| (1,13) | 0,0000 | 0,3775 | (6,4) | 1,000 | 0,760 | (10,8) | 0,000 | 0,064 |
| (2,1) | 0,5262 | 0,4367 | (6,5) | 0,474 | 0,798 | (10,9) | 0,000 | 0,242 |
| (2,3) | 0,5262 | 0,3084 | (6,7) | 1,000 | 0,752 | (10,11) | 0,000 | 0,166 |
| (2,4) | 0,0000 | 0,4737 | (6,8) | 0,000 | 0,564 | (10,12) | 0,526 | 0,293 |
| (2,5) | 0,0000 | 0,5119 | (6,9) | 1,000 | 0,742 | (10,13) | 0,000 | 0,101 |
| (2,6) | 0,0000 | 0,2135 | (6,10) | 1,000 | 1,000 | (11,1) | 1,000 | 0,557 |
| (2,7) | 0,0000 | 0,4653 | (6,11) | 0,474 | 0,666 | (11,2) | 1,000 | 0,621 |
| (2,8) | 0,0000 | 0,2774 | (6,12) | 1,000 | 0,793 | (11,3) | 1,000 | 0,429 |
| (2,9) | 0,0000 | 0,4552 | (6,13) | 0,526 | 0,601 | (11,4) | 1,000 | 0,594 |
| (2,10) | 0,7631 | 0,7135 | (7,1) | 0,526 | 0,471 | (11,5) | 1,000 | 0,633 |
| (2,11) | 0,0000 | 0,3793 | (7,2) | 1,000 | 0,535 | (11,6) | 0,526 | 0,334 |
| (2,12) | 0,5262 | 0,5070 | (7,3) | 1,000 | 0,343 | (11,7) | 1,000 | 0,586 |
| (2,13) | 0,0000 | 0,3142 | (7,4) | 1,000 | 0,508 | (11,8) | 0,526 | 0,398 |
| (3,1) | 0,5262 | 0,6284 | (7,5) | 0,000 | 0,547 | (11,9) | 1,000 | 0,576 |
| (3,2) | 0,4738 | 0,6916 | (7,6) | 0,000 | 0,248 | (11,10) | 1,000 | 0,834 |
| (3,4) | 0,0000 | 0,6654 | (7,8) | 0,000 | 0,312 | (11,12) | 1,000 | 0,628 |
| (3,5) | 0,0000 | 0,7035 | (7,9) | 0,526 | 0,490 | (11,13) | 0,526 | 0,435 |
| (3,6) | 0,0000 | 0,4052 | (7,10) | 1,000 | 0,748 | (12,1) | 0,000 | 0,430 |
| (3,7) | 0,0000 | 0,6570 | (7,11) | 0,000 | 0,414 | (12,2) | 0,474 | 0,493 |
| (3,8) | 0,0000 | 0,4690 | (7,12) | 0,526 | 0,542 | (12,3) | 0,474 | 0,301 |
| (3,9) | 0,0000 | 0,6468 | (7,13) | 0,526 | 0,349 | (12,4) | 0,474 | 0,467 |
| (3,10) | 1,0000 | 0,9052 | (8,1) | 1,000 | 0,659 | (12,5) | 0,000 | 0,505 |
| (3,11) | 0,0000 | 0,5709 | (8,2) | 1,000 | 0,723 | (12,6) | 0,000 | 0,207 |
| (3,12) | 0,5262 | 0,6987 | (8,3) | 1,000 | 0,531 | (12,7) | 0,474 | 0,458 |
| (3,13) | 0,0000 | 0,5059 | (8,4) | 1,000 | 0,696 | (12,8) | 0,000 | 0,270 |
| (4,1) | 0,5262 | 0,4630 | (8,5) | 0,474 | 0,735 | (12,9) | 0,000 | 0,448 |
| (4,2) | 1,0000 | 0,5263 | (8,6) | 1,000 | 0,436 | (12,10) | 0,474 | 0,707 |
| (4,3) | 1,0000 | 0,3346 | (8,7) | 1,000 | 0,688 | (12,11) | 0,000 | 0,372 |
| (4,5) | 0,0000 | 0,5381 | (8,9) | 1,000 | 0,678 | (12,13) | 0,000 | 0,307 |
| (4,6) | 0,0000 | 0,2398 | (8,10) | 1,000 | 0,936 | (13,1) | 1,000 | 0,623 |
| (4,7) | 0,0000 | 0,4916 | (8,11) | 0,474 | 0,602 | (13,2) | 1,000 | 0,686 |
| (4,8) | 0,0000 | 0,3036 | (8,12) | 1,000 | 0,730 | (13,3) | 1,000 | 0,494 |
| (4,9) | 0,0000 | 0,4815 | (8,13) | 0,526 | 0,537 | (13,4) | 0,474 | 0,660 |
| (4,10) | 1,0000 | 0,7398 | (9,1) | 1,000 | 0,482 | (13,5) | 0,474 | 0,698 |
| (4,11) | 0,0000 | 0,4055 | (9,2) | 1,000 | 0,545 | (13,6) | 0,474 | 0,399 |
| (4,12) | 0,5262 | 0,5333 | (9,3) | 1,000 | 0,353 | (13,7) | 0,474 | 0,651 |
| (4,13) | 0,5262 | 0,3405 | (9,4) | 1,000 | 0,519 | (13,8) | 0,474 | 0,463 |
| (5,1) | 1,0000 | 0,4249 | (9,5) | 0,000 | 0,557 | (13,9) | 0,474 | 0,641 |
| (5,2) | 1,0000 | 0,4881 | (9,6) | 0,000 | 0,258 | (13,10) | 1,000 | 0,899 |
| (5,3) | 1,0000 | 0,2965 | (9,7) | 0,474 | 0,510 | (13,11) | 0,474 | 0,565 |
| (5,4) | 1,0000 | 0,4619 | (9,8) | 0,000 | 0,322 | (13,12) | 1,000 | 0,693 |

In this stage of the study, the overall dominance scores of alternative pairs are calculated considering the sum of weights of ordinal and cardinal criteria. These scores are given in Table 5.

**Table 5. Overall Dominance Scores of Alternative Pairs**

| Pairs | $D_{ii'}$ | Pairs | $D_{ii'}$ | Pairs | $D_{ii'}$ | Pairs | $D_{ii'}$ | Pairs | $D_{ii'}$ |
|---|---|---|---|---|---|---|---|---|---|
| (1,2) | 0,528 | (3,10) | 0,943 | (6,4) | 0,856 | (8,12) | 0,837 | (11,6) | 0,411 |
| (1,3) | 0,412 | (3,11) | 0,344 | (6,5) | 0,669 | (8,13) | 0,533 | (11,7) | 0,751 |
| (1,4) | 0,512 | (3,12) | 0,630 | (6,7) | 0,850 | (9,1) | 0,688 | (11,8) | 0,449 |
| (1,5) | 0,346 | (3,13) | 0,305 | (6,8) | 0,340 | (9,2) | 0,726 | (11,9) | 0,745 |
| (1,6) | 0,167 | (4,1) | 0,488 | (6,9) | 0,844 | (9,3) | 0,610 | (11,10) | 0,900 |
| (1,7) | 0,507 | (4,2) | 0,715 | (6,10) | 1,000 | (9,4) | 0,710 | (11,12) | 0,776 |
| (1,8) | 0,205 | (4,3) | 0,599 | (6,11) | 0,589 | (9,5) | 0,335 | (11,13) | 0,471 |
| (1,9) | 0,312 | (4,5) | 0,324 | (6,12) | 0,876 | (9,6) | 0,156 | (12,1) | 0,259 |
| (1,10) | 0,656 | (4,6) | 0,144 | (6,13) | 0,571 | (9,7) | 0,496 | (12,2) | 0,485 |
| (1,11) | 0,267 | (4,7) | 0,296 | (7,1) | 0,493 | (9,8) | 0,194 | (12,3) | 0,370 |
| (1,12) | 0,741 | (4,8) | 0,183 | (7,2) | 0,720 | (9,10) | 0,854 | (12,4) | 0,470 |
| (1,13) | 0,227 | (4,9) | 0,290 | (7,3) | 0,604 | (9,11) | 0,255 | (12,5) | 0,304 |
| (2,1) | 0,472 | (4,10) | 0,843 | (7,4) | 0,704 | (9,12) | 0,730 | (12,6) | 0,124 |
| (2,3) | 0,395 | (4,11) | 0,244 | (7,5) | 0,329 | (9,13) | 0,426 | (12,7) | 0,464 |
| (2,4) | 0,285 | (4,12) | 0,530 | (7,6) | 0,150 | (10,1) | 0,344 | (12,8) | 0,163 |
| (2,5) | 0,308 | (4,13) | 0,414 | (7,8) | 0,188 | (10,2) | 0,267 | (12,9) | 0,270 |
| (2,6) | 0,129 | (5,1) | 0,654 | (7,9) | 0,504 | (10,3) | 0,057 | (12,10) | 0,614 |
| (2,7) | 0,280 | (5,2) | 0,692 | (7,10) | 0,848 | (10,4) | 0,157 | (12,11) | 0,224 |
| (2,8) | 0,167 | (5,3) | 0,576 | (7,11) | 0,249 | (10,5) | 0,180 | (12,13) | 0,185 |
| (2,9) | 0,274 | (5,4) | 0,676 | (7,12) | 0,536 | (10,6) | 0,001 | (13,1) | 0,773 |
| (2,10) | 0,733 | (5,6) | 0,331 | (7,13) | 0,419 | (10,7) | 0,152 | (13,2) | 0,811 |
| (2,11) | 0,228 | (5,7) | 0,671 | (8,1) | 0,795 | (10,8) | 0,038 | (13,3) | 0,695 |
| (2,12) | 0,515 | (5,8) | 0,369 | (8,2) | 0,833 | (10,9) | 0,146 | (13,4) | 0,586 |
| (2,13) | 0,189 | (5,9) | 0,665 | (8,3) | 0,718 | (10,11) | 0,100 | (13,5) | 0,609 |
| (3,1) | 0,588 | (5,10) | 0,820 | (8,4) | 0,817 | (10,12) | 0,386 | (13,6) | 0,429 |
| (3,2) | 0,605 | (5,11) | 0,221 | (8,5) | 0,631 | (10,13) | 0,061 | (13,7) | 0,581 |
| (3,4) | 0,401 | (5,12) | 0,696 | (8,6) | 0,660 | (11,1) | 0,733 | (13,8) | 0,467 |
| (3,5) | 0,424 | (5,13) | 0,391 | (8,7) | 0,812 | (11,2) | 0,772 | (13,9) | 0,574 |
| (3,6) | 0,244 | (6,1) | 0,833 | (8,9) | 0,806 | (11,3) | 0,656 | (13,10) | 0,939 |
| (3,7) | 0,396 | (6,2) | 0,871 | (8,10) | 0,962 | (11,4) | 0,756 | (13,11) | 0,529 |
| (3,8) | 0,282 | (6,3) | 0,756 | (8,11) | 0,551 | (11,5) | 0,779 | (13,12) | 0,815 |
| (3,9) | 0,390 | | | | | | | | |

The overall dominance scores obtained are used in calculating the appraisal scores used to rank alternatives. The appraisal scores calculated and ranking of the alternatives based on these scores are presented in Table 6, along with best airline rankings shared with public by Airhelp to enable an easier comparison.

**Table 6. Appraisal Scores and Ranking of Alternatives**

| Alternatives | A1 | A2 | A3 | A4 | A5 | A6 | A7 | A8 | A9 | A10 | A11 | A12 | A13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Scores | 0,041 | 0,030 | 0,056 | 0,040 | 0,079 | 0,191 | 0,048 | 0,219 | 0,052 | 0,001 | 0,150 | 0,030 | 0,135 |
| Rank | 9 | 11 | 6 | 10 | 5 | 2 | 8 | 1 | 7 | 13 | 3 | 12 | 4 |
| Best Airline Score | 6 | 5 | 12 | 9 | 2 | 10 | 7 | 1 | 3 | 4 | 13 | 8 | 11 |

When the ranking formed based on scores obtained with the help of the EVAMIX method are compared to the ranking by Airhelp, some differences can be observed. Qatar Airways is in the first place both in the best airline score ranking and also in the ranking using the EVAMIX method. The situation that this airline is in the first place in both rankings based on different criteria can be interpreted such that this company is in a distinct position in terms of superiority over other companies. The airlines that are ranked in the middle positions in the best airline scores are ranked in the lowest positions in the ranking based on the EVAMIX method. The lowest airlines there have moved to upper positions in this ranking. The reason might be that they have younger fleets and they endeavor to include more airplanes in their fleets. It is obvious that the ranking would alter when variables are changed.

## IV. CONCLUSION

In today's markets, companies are in a cutthroat struggle with each other. In this struggle, they continuously work on internal evaluations, collect data and sometimes share this data with public in order to showcase their innovations, their difference from the likes and their achievements in short term. The airline companies which are important shareholders of the transportation sector which is one of the most popular sectors in recent years implement various innovations and regulations in order to compete with other companies because this industry has a wide range of customers, is prevalent, and is no longer a luxury but a necessity. Certain tools are used to inform customers about these innovations, set strategies that can increase customer satisfaction, and ensure customer loyalty. The indices frequently published in recent years are predominant among these tools.

There are different indices that measure the performance of airlines. This study considers the Best Airline Index shared with public each year by Airhelp. The calculation of this index takes into account results obtained from the on-time performance, service quality, and claim processing measurements in order to rank airline companies. In parallel with this, this study examines the first 15 airline companies in the list, which also includes Turkish Airlines. However, Air Malta and Etihad Airways are excluded from the study because no sufficient data on these airlines could be found. The ranking of the remaining 13 airline companies among themselves are considered in this research.

The criteria used for making the best airline ranking are certainly important in distinguishing airlines from each other. However, it is an inevitable fact that changing the criteria used in studies would also change the ranking. Therefore, it is quite significant what perspective to assume in measurement and then present results in these kinds of studies.

In this study, a new ranking is created using different criteria as an alternative to the ranking by Airhelp. This alternative ranking is created based on the variables of average price per passenger, number of people, retail value, fleet, ordered plane number and average age of fleet using the EVAMIX method which is one of the multi-criteria decision-making methods.

In the conclusion of the study, Qatar Airways is the first in both rankings. This shows that Qatar Airways surpasses other airlines in terms of the variables examined. However, there are differences in the rest of the rankings. The companies ranked high in the list of Airhelp index such as Lufthansa and Singapore Airline are in the middle zone in the ranking created with different criteria and a different method. On the other hand, more strikingly, airline companies that are ranked low in the Airhelp list such as Turkish Airlines, Norwegian Airlines, Wizz Air, and Flybe show a significant variation and are placed on the top of the new list.

The results obtained are found to be the indicator that change in criteria taken into account may cause changes in the ranking obtained. For this reason, it is crucial to determine what is desired to measure when

making the comparison. In this case, it gains important to prefer the rankings in which the appropriate criteria are used in order to extract the information of interest because superiority of companies over each other may vary substantially.

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