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***Keywords:***

*At least 3 pieces,

Up to 5 Pieces,

9 punto and italic,

Words initial letters are large*

***Jel Codes:***

*C02 C30 C44*

**ABSTRACT**

*The abstract should be between 120 and 250 words in "Turkish". There should be at least 3 and at most 5 "keywords" appropriate to the content at the end of the abstract. Abstract(summary) part of the Abstract should be prepared as "English" translation of Turkish summary text and key words. The words "ABSTRACT (summary)" and "ABSTRACT", which are the titles of these sections, should be written in capital letters, bold, with "6 nk" paragraph spaces before and after paragraphs. Turkish and English abstract sections should be prepared with a 3.5 paragraph indent, justified and  9 points with their titles.* *Abstract text will be written in italics.*

***Anahtar Kelimeler:***

*En az 3 Adet,*

*En çok 5 Adet,*

*9 punto ve italik,*

*Kelime ilk harfleri büyük,*

***Jel Kodları:***

*C02 C30 C44*

**ÖZET**

*Özet kısmı "Türkçe" 120 - 250 kelime arasında olmalıdır. Özet sonunda içeriğe uygun en az 3 ve en çok 5 adet "anahtar kelime" yer almalıdır. Özetin Abstract kısmı Türkçe özet metnin ve anahtar kelimelerin "İngilizce" çevirisi olarak hazırlanmalıdır. Bu kısımların başlıkları olan "ÖZET" ve "ABSTRACT" kelimeleri büyük harflerle, koyu renkle, önce ve sonrasında "6 nk" paragraf boşlukları olacak şekilde yazılmalıdır. Türkçe ve İngilizce özet bölümleri başlıklarıyla birlikte 3,5 paragraf girintisi ile, iki yana yaslı olarak, 9 punto ile hazırlanmalıdır. Özet metin italik olarak yazılacaktır.*

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# 1. INTRODUCTION

Every moment of life entails making decisions that involve many participants, including people, groups, and institutions. With many decision criteria and various decision alternatives, multiple criteria decision-making (MCDM) is a crucial component of modern decision science (Toloie-Eshlaghy & Homayonfar, 2011). Researchers from several countries have studied MCDM approaches since the 1950s when the foundations of modern MCDM techniques were established, and new MCDM techniques have been developed (Zavadskas et al., 2014).

Applications for MCDM methods include social work, project management, business and financial management, transportation and logistics, environmental management, and many more fields (Toloie-Eshlaghy & Homayonfar, 2011).

# 2. BIBLIOMETRIC ANALYSIS and MCDM METHODS

With the use of bibliometric techniques, researchers can “base their findings on aggregated bibliographic data produced by other scientists working in the field who express their opinions through citation, collaboration, and writing” (Zupic & Čater, 2015, p.430).

**Table 1.** Summary of the Studies on Bibliometric Analysis of MCDM-Related Research in the Last Decade

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Author(s)** | **Scope** | **Timespan** | **Database** | **#Publications** |
| Basílio et al. (2022) | MCDM | 1945-2021 | WoS and Scopus | 20861 |
| Koca & Yıldırım (2021) | DEMATEL | 1999-2020 | WoS | 1963 |
| Ferreira & Santos (2021) | MACBETH | 1994-2016 | Scopus | 192 |
| de Souza et al. (2021) | MCDM in Research and Development (R&D) Project Portfolio Selection (PPS) | 1970-2020 | WoS and Scopus | 66 |
| Abdullah et al. (2021) | MCDM in managing water-related disaster events | 2000-2020 | WoS | 149 |
| Costa et al. (2021) | MCDM in personnel selection | 1994-2020 | Scopus | 63 |
| Minhas & Potdar (2020) | Decision support system in construction | 2000-2016 | WoS and Scopus | 5418 |
| Chowdhury & Paul (2020) | MCDM in corporate sustainability | 2007-2019 | Scopus, WoS, and Google Scholar | 52 |
| Morkūnaitė et al. (2019) | MCDM in heritage buildings | 1994-2018 | WoS | 180 |
| Chen et al. (2019) | ANP | 1997-2018 | WoS | 1485 |
| Yu et al. (2019) | Fuzzy optimization and decision making | 2002-2017 | Scopus | 370 |
| Yu et al. (2018) | MCDM | 1977-2016 | WoS | 4464 |
| Francik et al. (2017) | MCDM in agriculture | 1979-2015 | WoS | 1355 |
| Zyoud & Fuchs-Hanusch (2017) | AHP and TOPSIS | 1976-2015 | Scopus | AHP:10188; TOPSIS: 2412 |
| Liu & Liao (2017) | Fuzzy decision | 1970-2015 | WoS | 13901 |
| Tramarico et al. (2015) | AHP in supply chain | 1990-2014 | WoS | 116 |
| Zopounidis et al. (2015) | MCDM in finance | 2002-2014 | Scopus | 644 |
| Guerrero-Baena et al. (2014) | MCDM in corporate finance | 1980-2012 | Scopus | 347 |

Apart from the bibliometric analysis, the literature includes other review studies on MCDM methods’ applications. Some focused on MCDM methods and applications in general (Zavadskas et al., 2014), while others examined MCDM applications in specific fields, such as sustainable engineering (Stojčić et al., 2019), sustainable renewable energy development (Kumar et al., 2017), corporate sustainability (Chowdhury & Paul, 2020), logistics performance evaluation (Chejarla et al., 2022), supplier selection (Yildiz & Yayla, 2015), construction (Zhu et al., 2021), energy policy and decision-making problems (Kaya et al., 2018), oncology (Adunlin et al., 2015), architecture and engineering (Ogrodnik, 2019), financial modeling (Almeida-Filho et al., 2021), health care (Khan et al., 2022), and Covid-19 pandemic (Sotoudeh-Anvari, 2022). There are also review studies based on a specific MCDM method, such as TOPSIS (Behzadian et al., 2012), ELECTRE (Govindan & Jepsen, 2016), SWARA and WASPAS (Mardani et al., 2017), VIKOR (Gul et al., 2016), and COPRAS (Stefano et al., 2015).

# 3. METHODOLOGY

For the study, bibliometric analysis was conducted using Biblioshiny, an app providing a web interface for the bibliometrix package (Aria & Cuccurullo, 2017). This software tool is used due to its advantages with its user interface, Biblioshiny, and gaining more popularity in recent years compared to other tools (Moral-Muñoz et al., 2020).

The keywords in this study were determined by considering the MCDM-based bibliometric analysis studies conducted in the literature in recent years. First, the method's name and its abbreviation were selected as the search strings. Then, in addition to these keywords, MCDM-related keywords were added to avoid unrelated studies from being included in the dataset in case the method’s abbreviation is used in other fields.



**Figure 1.** The Flowchart of the Methodology

# 4. RESULTS

The main information about the dataset is given in Table 2. Among the document types, the majority are articles (WASPAS for 86.73%, MABAC for 93.63%, EDAS for 90.37%, CODAS for 88.81%, COCOSO for 93.07%, and MARCOS for 91.92%). The average age of documents and average citations per document are lower for methods published in recent years, as expected. The highest annual growth rate belongs to the COCOSO method. WASPAS is the method by which the most publications and most different sources are produced.

# 5. CONCLUSION

Numerous researchers continue to use MCDM techniques in a wide range of fields. In addition to the techniques that have been in use for a long time, new techniques advance the discipline. The researchers working in the field can benefit from observing the development of these methods. T

The findings also highlight that other than the publications belonging to the authors of the methods, fuzzy implementations of the methods have received interest, which is cited a lot. In addition, the results reveal the most productive and cited authors, journals, and countries for each method, which is valuable knowledge for researchers in the field.

**AUTHORS’ DECLARATION:**

This paper complies with Research and Publication Ethics, has no conflict of interest to declare, and has received no financial support. For the scale used in the article, it is declared by the authors that permission was optained from the original owner of the scale. The author(s) sent a signed "*Copyright Transfer Form*" to the journal. **Regarding the conduct of this research, an “*Ethics Permission Certificate*” dated ..../…../2023 and numbered …..… was obtained from the Ethics Committee of the University of …………………………..…….** / **There is no need to obtain ethical permission for the current study as per the legislation. The "*Declaration Form Regarding No Ethics Permission Required*" was sent to the journal by the authors on this subject.**

**AUTHORS’ CONTRIBUTIONS:**

Conceptualization, writing-original draft, editing – **Y1** and **Y2**, data collection, methodology, formal analysis – **Y1**, Final Approval and Accountability – **Y1** and **Y2**.

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**APPENDIX**

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