

A NEW HESITANT BIPOLAR Q-RUNG ORTHOPAIR FUZZY DECISION MAKING UNDER MABAC METHOD

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Abstract. Because of the numerous negative health effects that air pollution causes, increased industrialization and urbanisation in recent decades have made air pollution a major global concern. The purpose of this study is to look at how exposure to ground-level ozone O_3 and ambient particulate matter $PM_{2.5}$ pollution affects respiratory and cardiac mortality in India. We employed the fuzzy Multi Attribute Border Approximation Area Comparison (MABAC) technique, which contains the Hesitant bipolar q-Rung Orthopair Fuzzy Set (HBq-ROFS), to analyse the health risk assessment problem associated with air pollution in India. The MCDM methodology now in use is compatible with a fuzzy method based on the removal effects of criteria (MEREC) for establishing criteria weights. The stability and validity of the suggested technique are verified through the use of sensitivity and comparison analyses.

Keywords. Hesitant bipolar q-rung orthopair fuzzy set, modified MABAC method, MEREC method, MCDM.

1 Introduction

Due to uncertainty and limited knowledge, the decision-maker must assign smooth values to objective assessments in many situations involving decision-making. Alternatively, using different value sets to produce these estimations has gained popularity. Zadeh introduced the fuzzy set (FS) in 1965 as a productive method for modelling ambiguous data. A few years later, this set's release attracted a lot of attention for its ability to represent ambiguous data, and it continues to do so. Researchers in this situation have examined a number of fuzzy extensions, including bipolar fuzzy sets (BFS) (Zhang, 1994, 1998), intuitionistic fuzzy sets (IFS) (Atanassov, 1986), pythagorean fuzzy sets (PFS) (Yager 2013), hesitant fuzzy sets (HFS) (Torra 2010), q-rung orthopair fuzzy sets (q-ROFS) (Ali, 2018; Yager, 2017), and Hesitant