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# A bi-objective sustainable supplier selection and order allocation considering quantity discounts under disruption risks: a case study in plastic industry

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## **Research highlight:**

- ✓ A novel hybrid MCDM-MILP approach for SSS&OA problem is proposed.
- ✓ Two types of quantity discounts are considered.
- ✓ The disruption risks are applied.
- ✓ The Best worst method (BWM) as a new published MCDM approach is used.
- ✓ To solve the proposed model, a Revised Multi-Choice Goal Programming is applied.
- ✓ The proposed model is verified by a real-world case study in the north of Iran.
- ✓ A sensitivity analysis is utilized to check the robustness of the approach.

## **Abstract:**

In recent years, the supplier selection problem as one of the important components in sustainable development is considered which this is due to the importance of quality and quantity of the product and sustainability issues. Besides, in this paper, a decision-making tool is provided to solve the sustainable supplier selection and order allocation problem in a multi-period, multi-item, and multi-supplier environment considering quantity discounts and disruption risks. At first, one of the efficient Multiple Criteria Decision Making (MCDM) approaches called Best Worst Method (BWM) is employed to find a global importance weight of each determined criterion and the preference weights of each potential supplier according to these criteria. Then the proposed MILP model attempt to minimize the total costs and maximize the total score of all suppliers in respect to three sustainability aspects. Also, in order to solve the proposed bi-objective mathematical model, a Revised Multi-Choice Goal Programming (RMCGP) method is applied. Additionally, a consistency test is

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