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**Comparing fundamentals of additive and multiplicative aggregation in ratio scale multi-criteria decision making.** (English) [Zbl 1322.91020](#)

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Summary: Additive and multiplicative aggregations of ratio scale preferences are frequently used in multi-criteria decision making models. In this paper, we compare the advantages and limitations of these two aggregation rules by exploring only their fundamental properties after ratio scaled local priorities and criteria weights have been successfully generated from the decision maker. The comparisons of these properties are therefore independent of ancillary procedures such as interactive elicitations from decision makers, pairwise comparisons and calculations of local priorities and criteria weights. We compare six fundamental properties of the two aggregation rules. The criteria weights used in the multiplicative aggregation have complicated meanings which are not well understood and are often mixed up in the ambiguous notion of 'criteria importance'. As the scaling factors of the local preference values do not appear explicitly in the computations of the relative ratios of the overall preferences in the multiplicative aggregation model, the relative ratios remain unchanged when the scaling factors are changed or an alternative is added or deleted. Furthermore, the relative ratios in the multiplicative aggregation do not depend on similar local preference values which cancel each other out mathematically. It is quite evident that the additive aggregation model is superior and easier for decision makers to use and understand. We recommend the additive aggregation rule over the multiplicative aggregation rule.

**MSC:**

[91B06](#) Decision theory

[91B08](#) Individual preferences

Cited in **1** Document

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