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Financial modeling and improvement planning for the life insurance industry by using a rough knowledge based hybrid MCDM model

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Abstract

Financial modeling for the life insurance industry involves two main difficulties: (1) Selecting the minimal and critical variables for modeling while considering the impreciseness and interrelationships among the numerous attributes and (2) measuring plausible synergy effects among variables and dimensions that might cause undesirable biases for an evaluation model. To overcome these difficulties, this paper proposes a two-stage hybrid approach: Rough financial knowledge is retrieved first, and then the obtained core attributes are measured and synthesized using fuzzy-integral-based decision methods. The main innovation of this study is the use of rough knowledge retrieval procedures and fuzzy measures for exploring the synergy effects on financial performance. This approach is expected to support insurers to systematically improve their financial performance. A group of life insurance companies in Taiwan was analyzed, and the findings support the existence of interrelated synergy effects among the core criteria. In addition, five companies were examined to illustrate financial performance improvement planning with this approach. This study bridges the gap between advanced soft computing techniques and pragmatic financial modeling in a dynamic business environment.

Keywords: Multiple criteria decision-making (MCDM); DEMATEL-based Analytic network process (DANP); Rough set theory (RST); Fuzzy integral; Financial performance (FP); Multi-attribute utility theory (MAUT).

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