Fuzzy risk analysis under influence of non-homogeneous preferences elicitation in fiber industry

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ABSTRACT

Fuzzy risk analysis plays an important role in mitigating the levels of harm of a risk. In real world scenarios, it is a big challenge for risk analysts to make a proper and comprehensive decision when coping with risks that are incomplete, vague and fuzzy. Many established fuzzy risk analysis approaches do not have the flexibility to deal with knowledge in the form of preferences elicitation which lead to incorrect risk decision. The inefficiency is reflected when they consider only risk analyst preferences elicitation that is partially known. Nonetheless, the preferences elicited by the risk analyst are often non-homogeneous in nature such that they can be completely known, completely unknown, partially known and partially unknown. In this case, established fuzzy risk analysis methods are considered as inefficient in handling risk, hence an appropriate fuzzy risk analysis method that can deal with the non-homogeneous nature of risk analyst's preferences elicitation is worth developing. Therefore, this paper proposes a novel fuzzy risk analysis method that is capable to deal with the non-homogeneous risk analyst's preferences elicitation based on grey numbers. The proposed method aims at resolving the uncertain interactions between homogeneous and non-homogeneous natures of risk analyst's preferences elicitation by using a novel consensus reaching approach that involves transformation of grey numbers into grey parametric fuzzy numbers. Later on, a novel fuzzy risk assessment score approach is presented to correctly evaluate and distinguish the levels of harm of the risks faced, such that these evaluations are consistent with preferences elicitation of the risk analyst. A real world risk analysis problem in fiber industry is then carried out to demonstrate the novelty, validity and feasibility of the proposed method.