Estimate for risk reduction rate using fuzzy-AHP and Bayesian network

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Abstract: In Korea, there are regulations and systems in place engaging hazardous chemical handling facilities, which ensures sufficient safety measures from the facility design and installation stages to preventing human and material damage at the facility at a later time. Off-site risk assessment modality is the system. Application of this system generates discrete data from the facilities as well as the third parties outside the workplace. Through this assessment system, calculating the probability of risk factors is required considering the impact of occurrences and likelihood of a tragic accident outcome, which is typically based on the consumption of hazardous chemicals. In addition, strategic plans to reduce or eliminate this risk must be in place to ensure safety.

However, levels of acceptable risk are vague as to what degree the hazard is reduced or eliminated by the implementation of safety measures.

Therefore, a safety assurance tool that quantitatively evaluates how much risk is reduced or eliminated is needed. Utilization of this tool can assist in estimating the risk reduction rate according to the safety measure.

Precise evidence of risk reduction measures is difficult to obtain due to insufficient data and inadequate knowledge of the subject matter. Thus, the Bayesian Network (BN) updating past and expert data, as well as the Fuzzy set theory were employed to solve the uncertainty that may occur due to the subjectivity of adept material.

The results of this study indicate that by applying the valuable decision-making tool to calculate the risk reduction confirms how much of the prepared strategies can reduce the risk and feasibility by obtaining an acceptable risk as the best practice accumulating the quantified risk reduction rate.

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