Fuzzy model for resilience assessment of organizational processes

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Resilience is the intrinsic ability of a system to adjust its functioning prior to, during, or following changes and disturbances, so that it can sustain required operations under expected and unexpected conditions. This definition focuses on the ability to function, rather than on being impervious to failure, and thereby overcomes the traditional conflict between productivity and safety. Resilience engineering (RE) has fast become recognized as a valuable complement to the established approaches to safety of complex socio-technical systems and methods to assess organizational resilience are needed. However, few, if any, comprehensive and systematic research studies focus on developing an objective, reliable and practical assessment model for measuring organizational resilience. In this context, this work presents a model for resilience assessment in organizations, which presents three innovative features: 1) the use of leading indicators in order to monitor the effects of proactive safety work, as well as anticipate vulnerabilities. This is different from safety performance indicators (lagging indicators) that have commonly been used in traditional safety management, measuring outcomes of activities or events that have already happened; 2) adopting the approach of resilience engineering in the development of indicators – the indicators are based on six resilience engineering principles [1]: top-level commitment, awareness, preparedness, flexibility, just culture and learning culture; 3) the use of concepts and properties of fuzzy set theory to deal with uncertainty and imprecision of human judgment assessing indicators. The first step of the model is the construction of an ideal resilience pattern for the process we want to assessment using expert`s opinion. In this step, the leading indicators are linguistic variables represented by linguistic terms related to a set of linguistic terms represented by triangular fuzzy numbers. These triangular fuzzy numbers denote the importance degree of each leading indicator. The process of expert`s opinion aggregation for construction of the ideal resilience pattern uses the similarity aggregation method developed by Hsu and Chen [2], and it is used as a benchmark for resilience assessment. The final step of the model is the assessment of leading indicator performed by workers of the organizational domain. The results are compared with the ideal resilience pattern and then defuzzified using the center of area method. The result indicates the level of organizational resilience compared with the resilience ideal pattern. An exploratory case study [3] at the process of radiopharmaceuticals dispatch package of IEN was performed using this fuzzy model intending to validate it and exemplify its use. The results pointed out to strengths and weaknesses related to resilience engineering principles. This model using a leading indicator framework provided a basis for identification of potential problems in the process of radiopharmaceuticals package dispatch [4]. This model can be applied in any safe-critical organization with adjustments in the leading indicators and its metrics that should be developed according to the characteristics of these organizations [5].

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