

Development of a framework for assessing organizational performance based on resilience engineering and using fuzzy AHP method: A case study of petrochemical plant

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Abstract

Introduction: Resilience engineering (RE), as a new approach in the system safety domain, is intended to preserve the performance of socio-technical systems in various conditions; and accentuates the positive activities instead of the failure modes. The aim of this study was to develop a new framework for safety assessment on the basis of RE, using the Fuzzy Analytical Hierarchy Process (AHP) method.

Material and Method: Current study is an analytical cross-sectional survey performed in a petrochemical industry. Initially, six RE indicators were selected, including top management commitment, just culture, learning culture, awareness, flexibility and emergency preparedness and accordingly an assessment framework was established. Then, the selected RE indicators were evaluated and validated by experts in a specialized panel. Following, an indicator was proposed named “resilience early warning indicator”. Finally, the RE indicator score of the total process was determined using the fuzzy evaluating vector.

Result: Findings revealed that top management commitment and learning indicators have the most and the least effects on the RE level of the process, respectively. Besides, the flexibility (C3) indicator was located in orange early warning zone (OEWZ) while other indicators were positioned in the no early warning zone (NEWZ). Furthermore, the overall resilience level of the process was evaluated as level III (NEWZ).

Conclusion: Management commitment and emergency preparedness are two main indicators of RE and can carry out the most important effect for remaining the RE in the NEWZ level.

Key words: AHP, Fuzzy Theory, Resilience Engineering (RE), Resilience Warning Indicator, Safety

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