

RISK ANALYSIS OF CORRODED OIL AND GAS PIPELINE USING BAYESIAN NETWORK APPROACH

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INTRODUCTION

- The pipeline failure due to corrosion is the most significant factor in oil and gas pipeline failure which causing massive property loss and damage to the environment, resulting in liquid leakage and gas release.
- The main objective is to conduct risk assessment of corroded oil and gas pipeline using Bayesian network approach in order to solve the corrosion problem from the root causes.

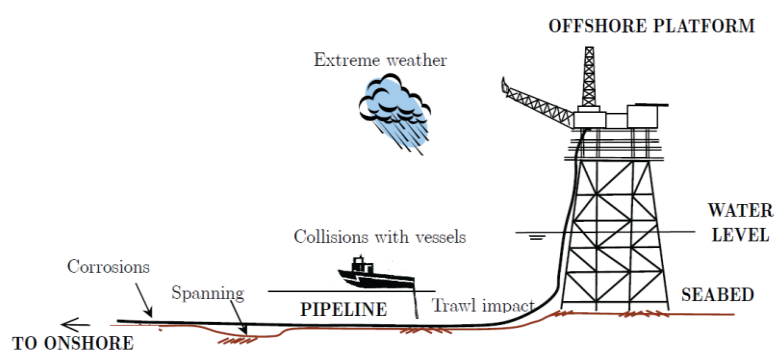
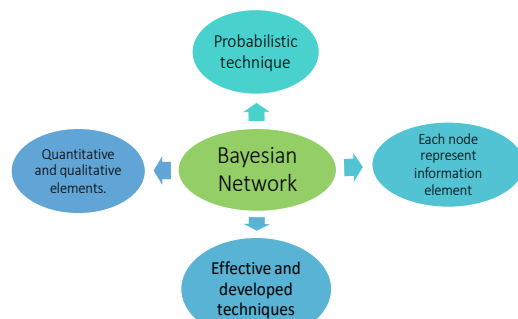


Figure 1: Different types of pipeline hazards

METHODOLOGY



Bayesian Network consists of two parts:
 Qualitative: Directed Acyclic Graph (DAG)



Quantitative : Conditional Probability Table (CPT)

$$P(Cause | Effect) = \frac{P(Cause)P(Effect|Cause)}{P(Effect)}$$

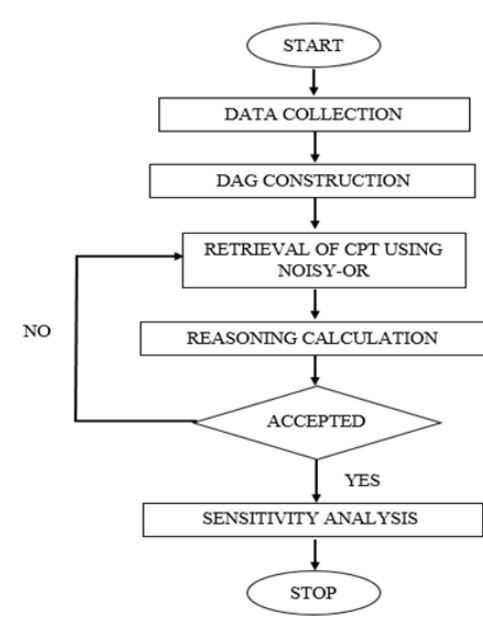


Figure 2: Simulation framework

RESULTS AND DISCUSSIONS

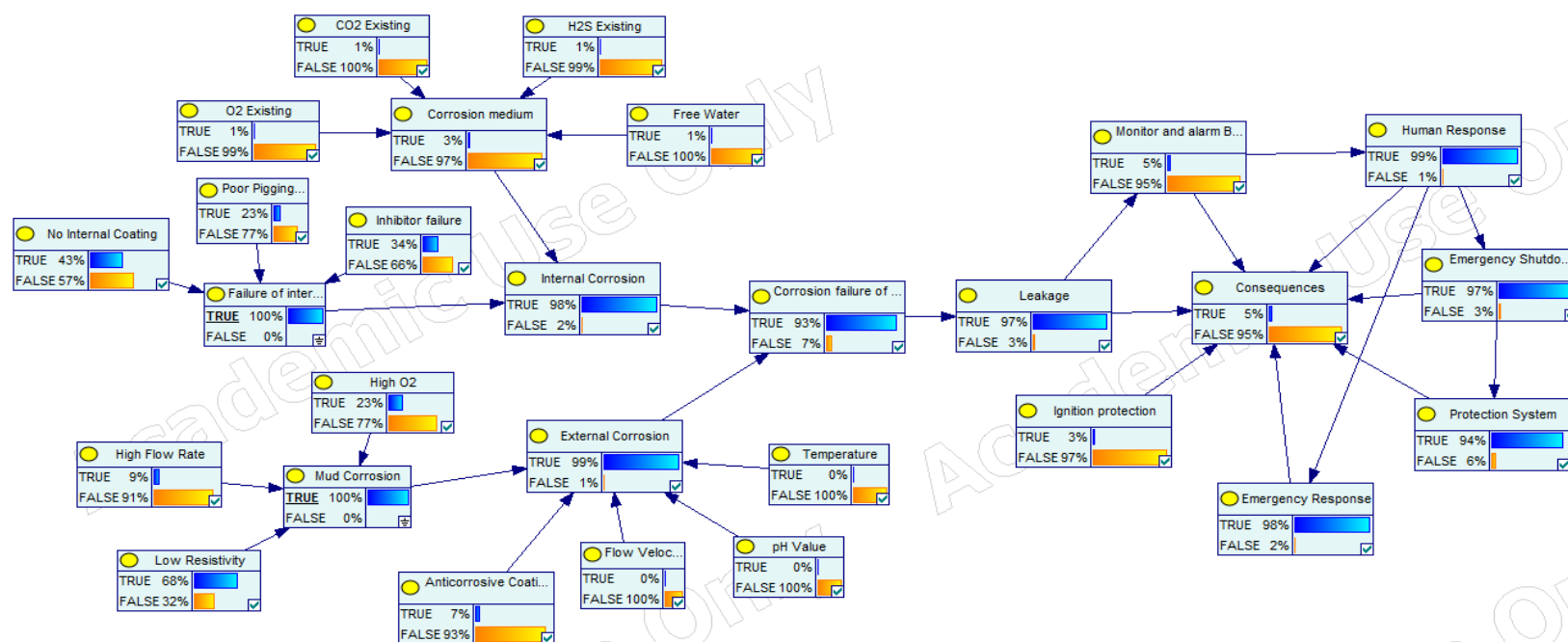


Figure 3: Proposed BN model for risk analysis of corroded pipeline

- The proposed model was developed using Genie Software.
- The proposed model portrays the relationships of the factors that may causes failure to the corroded pipeline and the consequences associated to failure.
- Sensitivity analysis was conducted to identify the most influence or critical factor associated to a certain simulated situation. For instace the most influence factor for external corrosion is from mud corrosion and internal corrosion is due to failure of internal protection. .

CONTRIBUTIONS

- Help the technical and non-technical person to understand the dependencies among the variables associated to corroded pipeline qualitatively.
- Capture the uncertainty and complex dependencies among causes of root failure from various sources.
- Assist operators in maintaining and managing the pipeline integrity
- Enables decision makers to make informed decisions, prioritize actions, and distinguish possible actions associated to the risks.

ACKNOWLEDGEMENT

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