World Academy of Science, Engineering and Technology
International Journal of Industrial and Manufacturing Engineering
Vol:9, No:10, 2015

Chairussyuhur Arman, Totti Tjiptosumirat, Muhammad Gunawan, Mastur, Joko Priyono, Baiq Tri Ratna Erawati

Authors : Maria M. Giannakou, Athanasios K. Ziliaskopoulos

Abstract : Transmission pipelines carrying natural gas are often routed through populated cities, industrial and environmentally sensitive areas. While the need for these networks is unquestionable, there are serious concerns about the risk these lifeline networks pose to the people, to their habitat and to the critical infrastructures, especially in view of natural disasters such as earthquakes. This work presents an Integrated Pipeline Risk Management methodology (IPRM) for assessing the hazard associated with a natural gas pipeline failure due to natural or manmade disasters. IPRM aims to optimize the allocation of the available resources to countermeasures in order to minimize the impacts of pipeline failure to humans, the environment, the infrastructure and the economic activity. A proposed knapsack mathematical programming formulation is introduced that optimally selects the proper mitigation policies based on the estimated cost – benefit ratios. The proposed model is demonstrated with a small numerical example. The vulnerability analysis of these pipelines and the quantification of consequences from such failures can be useful for natural gas industries on deciding which mitigation measures to implement on the existing pipeline networks with the minimum cost in an acceptable level of hazard.

Keywords : cost benefit analysis, knapsack problem, natural gas distribution network, risk management, risk mitigation
Conference Title : ICEIBM 2015 : International Conference on Economics, Industrial and Business Management
Conference Location : Barcelona, Spain
Conference Dates : October 26-27, 2015