

Calculating Risk of Cost in Civil Engineering Projects by Using Imprecise Probability and the Theory of Soft Sets

Andrzej Pownuk

October 17, 2009

There is a difference between the real and the estimated cost of the civil engineering projects. Unfortunately, in civil engineering usually we do not have enough data to calculate reliable probabilistic characteristics. In such situation it is possible to apply interval parameters, fuzzy parameters, random sets or subjective probability. Probabilistic characteristics can be modeled by random numbers (which are defined by the expert) with the uncertain parameters. The total cost is described by probability density functions with the interval parameters (for example interval mean or interval standard deviation), p -boxes (if the type of the PDF is unknown) or fuzzy random probability distribution function. Using assessment from different (or even one) experts it is possible to estimate the uncertainty of the probability density function of the partial costs. Using modified Monte-Carlo simulation it is possible to calculate the uncertain risk curve. Example risk curve is shown on the Fig. 1. Each project can be

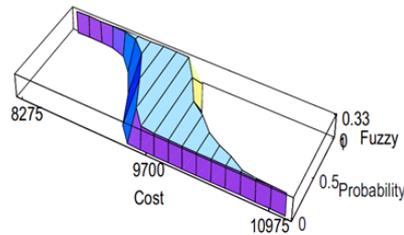


Figure 1: Uncertain risk curve

described by the Petri network. In order to describe multidimensional structure of the risk the theory of soft sets may be applied.