

Water Infrastructure Asset Valuation Approach and Optimal Renewal Engineering Policies

ABSTRACT:

As critical components of infrastructure management systems, after Government Accounting Standards Board's statement 34 (GASB 34) enforcement, development of valuation approach and optimal Rehabilitation and Replacement policies (R&R policies) for infrastructure assets become an overriding concern to governmental agencies. To comply with GASB 34 requirements, governments must report the value of their infrastructures' assets by using a depreciation method or a modified approach. However, including these two, most existing valuation approaches do not properly account for the change of assets' conditions and time-value of money. This may lead to absurd asset value especially for infrastructures that have significantly longer service life than other capital assets. This study proposes an asset valuation model, combined with Markov chainbased, condition prediction and regression-based, price index prediction to capture the change of asset condition and time value of money. The model will not only assist in predicting the future value of the asset but also play an important role in constructing the optimal R&R policies and the timing of their application. This study also describes the development of two-step optimization process for R&R policies that include project and network levels optimizations. In project level optimization, probabilistic dynamic programming analyzes the life cycle cost of a system. In network level optimization, fuzzy logic theory optimizes the allocation of limited funds and prioritization policies for the infrastructure system.

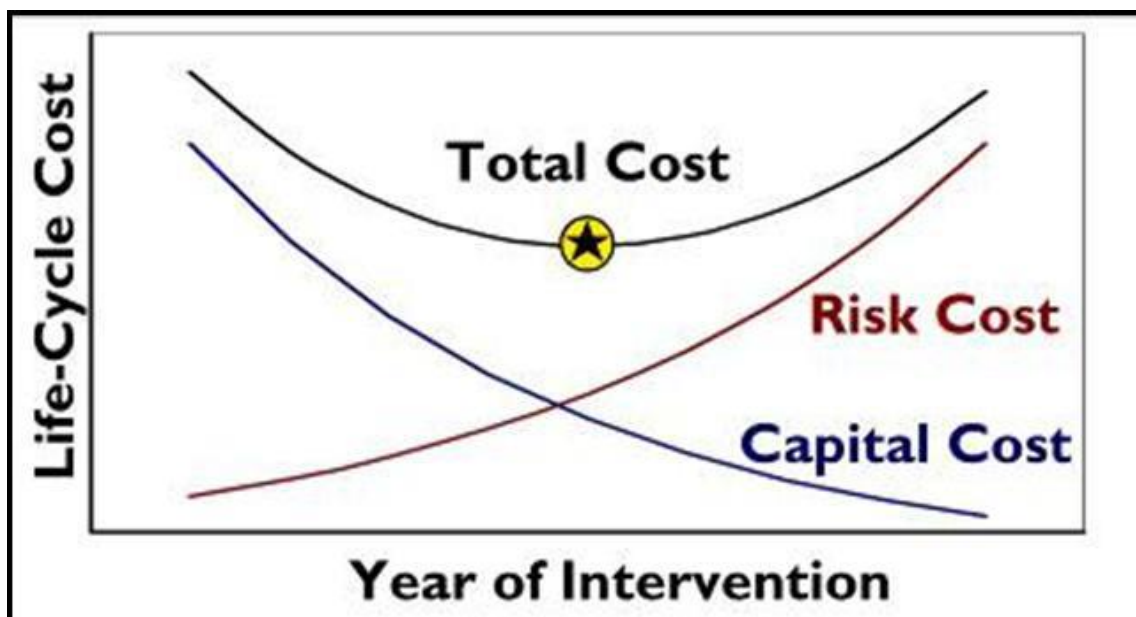


Figure 1: Life Cycle Cost Analysis for Water Infrastructure System

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