



Suryeon Kim

Benchmarking previous similar project data against estimates is a preferred strategy for improving change order management (Ko et al., 2023). It allows for the recall, reasoning, and reuse of lessons learned, enhancing accuracy, reducing inefficiencies, and avoiding past mistakes (Goh and Chua, 2009). This approach is especially beneficial for State Highway Agencies (SHAs) in developing and evaluating the engineer's estimate, the final cost estimate in the design phase. Despite using benchmarked data, SHA projects still face discrepancies between the engineer's estimate and final costs due to the lack of systematic identification of similar historical projects. This research aims to improve change order management by using case-based reasoning (CBR) algorithms to identify similar historical projects and potential change order items. CBR, based on the psychological theory that humans solve new problems by recalling past experiences, retrieves cases based on attributes and their weights, case usage, and adaptation. Historical data from 5,564 highway projects, including the final engineer's estimate and the contractor's as-built pay items, were fed into CBR algorithms. These algorithms identify similar projects by basic characteristics and work item costs and quantities. This research benefits SHA engineers by offering insights into historical change order patterns, improving the reliability of engineer's estimates.