Sustainable Cost Optimisation Measures for The Lifecycle of Tolled Highway Projects in Malaysia

ABSTRACT

The implementation and maintenance of highway infrastructure often requires significant capital throughout its life cycle which affects stakeholders including the government, developers, operators, users, etc. Furthermore, the sustainability aspect and existing toll systems in Malaysia are currently in the midst of being re-evaluated in order to attain a long-term gain that benefits both road users and relevant stakeholders. The objective of this study is to propose a Life Cycle Cost Analysis (LCCA) model for sustainable highway projects in Malaysia which considers certain cost optimisation measures throughout the stages of concept, design, construction, and operation & maintenance. The proposed LCCA model intends to act as a cost optimisation tool that provides sustainability recommendations for toll systems, highway alignments, pavement maintenance and rehabilitation, existing policies, contract and project type, material, equipment, time-cost factor, etc. Additionally, a relationship between the financial efficiency of toll systems and the affect it has on the overall cost of highway projects was established. The significance of cost pertaining to highway infrastructure components and the perception of toll systems was evaluated via a survey questionnaire; distributed to a select group of senior and principal engineers. The survey utilised a 5-point Likert scale which assisted in forming a regression analysis along with determining a correlation between toll systems and the overall cost of highway projects. Secondary data obtained from a reputable consultancy aided in understanding highway components that could potentially undergo further cost optimisation. Lastly, the sustainable and cost optimised LCCA model consists of recommendations and measures intended for a new age of sustainable highway projects in Malaysia.