

**ANALYSIS ON SUITABILITY OF BUILT- OPERATE -  
TRANSFER SYSTEMS FOR SRI LANKAN  
EXPRESSWAYS: A CASE STUDY ON COLOMBO-  
KATUNAYAKE EXPRESSWAY (CKE)**

Mailange Amila Prasadani Perera

(168335B)

Degree of Master in Engineering

Department of Civil Engineering

University of Moratuwa

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Thesis submitted in partial fulfillment of the requirements for the degree Master of  
Engineering in Highway & Traffic Engineering

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## **DECLARATION**

I declare that this is my own work and the thesis does not incorporate without acknowledgement any material previously submitted for a degree in any other University or institute of higher learning and to the best of knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

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## **ABSTRACT**

Sri Lankan transport network achieved a significant development during the last decade by utilizing foreign concessions and local government funds for expressway development. Road Development Authority holds the authority to operate and maintain the road system periodically and mainly travel time-saving, developed infrastructure and living standards in association with social benefit are the user benefits generated with these expressways.

As a developing country, a lack of financial stability for infrastructure development by the government may lead to foreign loans and concessions. The concessions lead to rapid involvement in the fund involvement for mega infrastructure projects as the necessity and demand of the country. The Build-Operate and Transfer (BOT) concession model is becoming a trend in the privatization of infrastructure projects. For these BOT Contracts, the concession period, interest rates are becoming the critical parameters and main considerations.

In this study, a model was developed to demonstrate the potentiality of applying the BOT model for an operating expressway of Colombo-Katunayake-Expressway. The demand estimation, operational and maintenance cost, and toll revenue were used as inputs to this model and financial viability was observed with different scenarios. The concession period, interest rates, and optimality of selection of BOT were decided with different criteria based on financial viability.

As the Colombo-Katunayake Expressway (CKE) meets a considerable high demand for traffic in the Sri-Lankan highway network, input variables from CKE were used to demonstrate the potentiality of applying the BOT model, and optimum subsidy level was determined with the application of variable concessionary periods to minimization of the ridership guarantee, the gap in-between the accumulated revenue and accumulated costs.

Also, this BOT model is modified to validate any expressway network on an urban or suburban basis by considering the traffic demand by considering the unit length costs and unit length revenues in operations with the proposed analysis for functioning expressways in Sri Lanka.

By considering main operational expressways of the country, as Southern Expressway, Outer Circular Highway (OCH), and forecasted traffic on Central Expressway and proposed Ruwanpura Expressway urban and sub-urban links were defined for the developed BOT model and operational and maintenance costs and revenue for unit length basis were obtained for

each link. Finally, this developed BOT model was described to define and evaluate any expressway link by considering different concessionaire types obtained.

Key words: BOT, Concession period, financial viability, Traffic demand, Ridership guarantee, Economic Analysis

## **DEDICATION**

To

My Loving Mother

Who Always Give Me Strength toward Success

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.....

Name: M.A.P. Perera

Reg No: 168335 B

University of Moratuwa.

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## **LIST OF ABBREVIATIONS**

RDA	–	Road Development Authority
CKE	–	Colombo –Katunayake – Expressway
OCH	–	Outer Circular Highway
MTC	–	Manual Toll Collecting
ETC	–	Electronic Toll Collecting
BOT	–	Built – Operate – Transfer
ITS	-	Intelligent Transport Systems
EOMU	-	Expressway Operation and Maintenance Management Unit
STDP	-	Southern Transport Development Project
SLR	-	Sri Lankan Rupees
USD	-	United State Dollars
O&M	-	Operation and Maintenance
GOSL	-	Government of Sri Lanka