



# **PROCEEDINGS OF THE CONFERENCE ON RESEARCH FOR TRANSPORT AND LOGISTICS INDUSTRY**



**AND**



**Colombo, Sri Lanka**  
*3<sup>rd</sup> and 4<sup>th</sup> June, 2016*

Copyright © June 2016  
Sri Lanka Society for Transport and Logistics

National Library of Sri Lanka - Cataloguing-In-Publication Data  
Proceedings of the Conference on Research for Transport and Logistics Industry - 2016



ISSN 2513-2512

Chief Editor  
T Lalithasiri Gunaruwan  
Department of Economics, University of Colombo, Sri Lanka [tlgun@econ.cmb.ac.lk](mailto:tlgun@econ.cmb.ac.lk)

Published by  
Sri Lanka Society for Transport and Logistics  
C/o Department of Transport & Logistics Management  
Faculty of Engineering, University of Moratuwa  
Moratuwa, Sri Lanka.  
Tel : +94 112 650492, Web : <http://www.slstl.lk/>

All rights reserved. No Part of this Publication may be reproduced, stored in a retrieval system or transmitted by any means, electronic, mechanical, photocopying, recording or otherwise, without the written permission of the publisher.

*Facts and opinions published herein are solely personal statements made by the respective authors. Authors are responsible for the contents of their research papers including the accuracy of facts and statements and citations of resources. R4TLI, its editorial and scientific committees and organisers disclaim any liability for violations of other parties' rights, or any damage incurred as a consequence of the research published herein.*

Cover design by



**Jigsaw Ensemble Private Limited**

15/1, Lake Drive, Off Subhuthipura, Battaramulla, Sri Lanka  
<http://jgsw.global/>

Printed by

**Premier Print & Graphics**

909/5, Adhikaram Mawatha, Ethul Kotte, Kotte, Sri Lanka.  
Tel: +94 776 63 83 53, + 94 773 64 69 98

Sponsored by



**Message from the Chairman**  
**Sri Lanka Society for Transport and Logistics**  
**(SLSTL) and R4TLI – 2016 Conference Chair**



The inauguration of the R4TLI - Research for Transport and Logistics Industry came from a growing understanding of the gulf that exists between the practice and research of transport and logistics in many developing countries including Sri Lanka. It is becoming increasingly apparent that Sri Lanka which seeks to exploit its geographic position to re-establish itself as a global logistics hub needs to reach the state of the art operational levels to compete with the already well established and rapidly advancing hubs both to the east and west of Colombo. Its poor choice of investment in logistics infrastructure, lack of cutting edge research or development does not auger well for its ambitions to become a logistics hub.

The R4TLI conference is a humble, yet significant beginning to harnessing the synergies of academia and industry in an effort to improve the performance of the transport and logistics industry in Sri Lanka and other developing countries. The conference which has attracted abstracts from senior academics as well as young researchers both from Sri Lanka and the region, is a validation of the potential for research and development.

Since the conference aims at high-end research, rigorous quality control has been carried out to ensure that all papers presented at the conference are of international standard. A panel of international reviewers from Japan, Hong Kong, Australia, Canada, Taiwan, Sri Lanka and Singapore have reviewed and recommended papers for presentation. While over 60 abstracts were received, only around 40 were accepted for inclusion in the proceedings. Only around 20 authors have been invited to submit full papers.

I am also encouraged by the assistance given by the Chartered Institute of Logistics and Transport Sri Lanka (CILTSL) and the membership of the Sri Lanka Society for Transport and Logistics (SLSTL). The unstinted financial support from the industry lead by the sole sponsors Walkers CML and the enthusiastic sponsorship received for the research awards from several leading establishments in the field of transportation and logistics has been overwhelming.

I also wish to place on record the assistance received from the Joint Organising Committee and the Scientific Committee of this conference which has greatly contributed to making this conference a success. Furthermore, the assistance received from the Secretariat of the CILTSL and the SLSTL is also duly acknowledged. The support extended by the Eastern Asia Society for Transport Studies (EASTS) and the personal attendance at the conference by its leadership is also greatly appreciated.

Thank you.

Amal S. Kumarage PhD  
Chairman - Joint Organising Committee

**Message from the Chairman**  
**Chartered Institute of Logistics and Transport -**  
**Sri Lanka**



I am extremely happy and privileged to avail this opportunity to share a few congratulatory words with all those who are involved with the inaugural symposium on Research for Transport & Logistics Industry (R4TLI). This is an initiative spearheaded by the Chartered Institute of Logistics and Transport - Sri Lanka (CILTSL) and the Sri Lanka Society of Transport and Logistics to foster a culture of research and development within our industry in Sri Lanka.

This research symposium provides a forum for bringing academics, industry professionals, and students together to share their findings with the Logistics and Transport community. I am encouraged by the very high response received for the Call for Abstracts, which reflects the demand for such an opportunity by the research community into this very important and internationally relevant subject area, and the research potential and talents of the authors. It also demonstrates the possibility of this initial effort turning out to be a great success in bringing out items of immense interest to all stakeholders, both from Sri Lanka and overseas. I wish to acknowledge the dedication and commitment of the Scientific Committee and the Review Panel for making this an outstanding event. I also congratulate the authors who have put in so much effort in preparing their submissions and presentations. Moreover, I extend a warm thank you to each and every person and organisation that have been involved in this endeavour and their generous support in making this conference a success.

I trust that this symposium will be the first of many, and will serve a catalyst for further research on these aspects, enabling us to have more events of this nature in the coming years. I strongly believe that the outcome of such events will bring tangible benefits to the industry, both at home and abroad, and will pave the way for its furtherance into the future.

Have a successful and enjoyable R4TLI.

Capt. Lasitha Cumaratunga, Master Mariner, CMILT, MICS  
Chairman - CILTSL

**Message from Professor Tetsuo Yai,  
President of the Eastern Asia Society for Transportation  
Studies (EASTS)**



Dear Distinguished Members of Sri Lanka Society for Transport & Logistics,

I am pleased to extend, on the behalf of Eastern Asia Society for Transportation Studies (EASTS), the warmest congratulations to the first international conference of SLSTL, Research for Transport & Logistics Industry (R4TLI).

EASTS was founded in November 1994 with 13 countries/regions in Eastern Asia. As of September 2015, the member domestic societies join from 19 countries/regions, including Sri Lanka. More countries/regions are expected to join as member domestic societies.

The primary objective of EASTS is to foster and support excellence in transportation research and practice. Under the objectives, EASTS is organizing biennial International Conferences. Since the 1st Conference held in Manila, Philippines in 1995, 11 conferences were held in EASTS area and provided great opportunities to enrich participants' professional knowledge. The 12th conference will be held in September 2017 in Binh Duong, Vietnam.

We believe SLSTL has contributed significantly in Sri Lanka and could be a more essential key player throughout the world. I believe SLSTL has significant potential and will thrive more with your continuous support and contribution.

Once again, congratulations to the first international conference.

Tetsuo Yai,  
President of EASTS  
Professor, Dr. of Eng., Tokyo Institute of Technology

## **Message from Professor Chan Wirasinghe**

I am pleased to be associated with the inaugural international conference on “Research for Transport and Logistics Industry (R4TLI 2016)” to be held in Sri Lanka in June 2016, organized by the Sri Lanka Society of Transport and Logistics and the Chartered Institute of Transport and Logistics Sri Lanka. The submissions selected for the conference, from authors ranging from international experts to Sri Lankan students, are of high quality and cover a wide range of topics from theoretical to practical applications as well as logistics to passenger transportation. The Conference will in particular be a boon to the burgeoning logistics sector of Sri Lanka. I am very confident that the R4TLI 2016 will be an outstanding success. I congratulate Professor Amal Kumarage and others for organizing an international conference that will have an impact on academia and industry beyond the shores of Sri Lanka.



Sincerely,

S.C. (Chan) Wirasinghe  
Co-Chair, Scientific Committee  
Professor of Civil Engineering  
Founding Dean (Emeritus) Schulich School of Engineering

## Editorial Preface

Modern society faces a real challenge of producing and delivering transport and logistics services demanded through the production and consumption activities of the socio-economy. It is imperative that these services are generated and supplied efficiently in order to make such economic activities competitive and less costly while making the maximum possible contribution to the nation's GDP through the process of providing such services. Yet, at the same time, it is equally important that their derived necessity in the socio-economy be minimised, given the negative externalities with which their production and delivery are associated.

These twin challenges call for scientific endeavours in the transport and logistics sector to diagnose the issues it faces, to evolve innovative methods for the industry-wide adoption, to ensure continuous technological advancement, and to formulate and implement strategic plans and policies, in view of supporting it to emerge successful in the ever-intensifying competition of a business environment.

The inaugural Research Conference R4TLI-2016 was organised jointly by the *Sri Lanka Society for Transport and Logistics* and the *Chartered Institute of Logistics and Transport - Sri Lanka* as part of an effort to address this need, by encouraging the pursuit of research and dissemination of their findings. This publication is the culmination of that effort, and an accomplishment in itself.

As the Editorial Committee, we consider it a privilege to have had the opportunity to go through the rich collection of abstracts compiled herein, which proved to be a reward in itself. We are confident that this book provides ample proof of the potential *R4TLI 2016* has, to become an intellectually stimulating event.

We are grateful to the eminent reviewers from both Sri Lanka and abroad who tirelessly contributed through an intensive process of reviewing abstracts, and without whom it would not have been possible to compile this publication in its present quality and standing.

It is our hope that the *SLSTL* and *CILT-SL* will sustain the momentum that *R4TLI 2016* has gained in stimulating discourse on the significance, potential and challenges of the transportation and logistics industry, and in strengthening it, in years and conferences to come.

### Chief Editor

T Lalithasiri Gunaruwan, *BSc (Colombo), MSc (AIT), Dr ès Sc Econ (Paris), CMILT*

### Members

Lalith Edirisinghe, *MBA (Sri J), PGDBM (Colombo), EDM, CMILT, Chartered Marketer*

Thivya P. Amalan, *B.Sc in T&LM (Moratuwa), M,Sc in T&LM (Moratuwa), MILT*

Chathuni Uduwela, *LLB (London), LLCM, ATCL*

Uthpalee Hewage, *B.Sc in T&LM (Moratuwa)*

Asith Hettiarachchi, *B.Sc in Business IT (Staffordshire)*

# CONFERENCE ON RESEARCH FOR TRANSPORT AND LOGISTICS INDUSTRY 2016



## **Inaugural International Symposium**

organised jointly by  
Sri Lanka Society for Transport and Logistics (SLSTL)  
in association with  
Chartered Institute of Logistics and Transport (CILT) Sri Lanka  
in partnership with Walkers CML

## **CONFERENCE ORGANISING COMMITTEE**

Prof Amal S. Kumarage, University of Moratuwa (Chair)

Dr T Lalithasiri Gunaruwan, University of Colombo

Dr Tissa Liyanage, Master Hellie's Engineering Consultants

Dr Pradeepa Jayaratne, University of Moratuwa

Dr Terrance Mohanaraj, University of Ruhuna

Ms Thivya P. Amalan, University of Moratuwa

Capt Lasitha Cumaratunge, Hayley's Advantis

Mrs Namalie Siyambalapatiya, Road Development Authority

Mrs Gayani de Alwis, Supply Chain Management Consultant

Mr Ravi Edirisinghe, Freightlinks

Mr. Lalith Edirisinghe, CINEC Campus

Dr Ganga Samarasekera, SLIIT

Maj. Gen. Lionel Aluvihare, CILT Secretariat (convenor)

Maryse de Costa, CILT Secretariat (Secretary)



## **SCIENTIFIC COMMITTEE**

Prof SC Wirasinghe, University of Calgary (Co-chair)

*Prof Amal S Kumarage, University of Moratuwa (Co chair)*

Professor Steven Chien, New Jersey Institute of Technology

Dr Mahinda Bandara, University of Moratuwa

Dr Prem Samaranayake, University of Western Sydney

Dr H R Pasindu, University of Moratuwa

Dr Anburvel, University of Jaffna

*Dr Ganga Samarasekera, SLIIT*

*Dr Pradeepa Jayaratne, University of Moratuwa*

*Mr. Lalith Edirisinghe, CINEC Campus*

*Dr T Lalithasiri Gunaruwan, University of Colombo*

*Italics- Members of the Joint Organising Committee (Co-opted)*

## **EDITORIAL COMMITTEE**

Dr T Lalithasiri Gunaruwan [Chairperson]

University of Colombo, Sri Lanka [tlgun@econ.cmb.ac.lk](mailto:tlgun@econ.cmb.ac.lk)

Mr Lalith Edirisinghe

CINEC Maritime Campus, Sri Lanka [edirisinghe@cinec.edu](mailto:edirisinghe@cinec.edu)

Ms Thivya P. Amalan

University of Moratuwa, Sri Lanka [amalant@yahoo.com](mailto:amalant@yahoo.com)

Ms Chathuni Uduwela

University of Colombo, Sri Lanka [chathuniuduwela@gmail.com](mailto:chathuniuduwela@gmail.com)

Ms Uthpalee Hewage

University of Moratuwa, Sri Lanka [uthpaleesh@gmail.com](mailto:uthpaleesh@gmail.com)

Mr Asith Hettiarachchi

Staffordshire University, Sri Lanka [asith@jgsw.global](mailto:asith@jgsw.global)

## REVIEW PANEL

Varuna Adikariwattage

University of Moratuwa, Sri Lanka, [vadikari@ucalgary.ca](mailto:vadikari@ucalgary.ca)

Shinya Hanaoka

Tokyo Institute of Technology, Japan, [hanaoka@ide.titech.ac.jp](mailto:hanaoka@ide.titech.ac.jp)

Kuancheng Huang

National Chiao Tung University, Taiwan, [kchuang@cc.nctu.edu.tw](mailto:kchuang@cc.nctu.edu.tw)

Kazuhiko Ishiguro

Kobe University, Japan, [ishiguro@maritime.kobe-u.ac.jp](mailto:ishiguro@maritime.kobe-u.ac.jp)

Lina Kattan

University of Calgary, Canada, [lkattan@ucalgary.ca](mailto:lkattan@ucalgary.ca)

Becky Loo

University of Hong Kong, Hong Kong, [bpyloo@hku.hk](mailto:bpyloo@hku.hk)

Babak Mehran

University of Regina, Canada, [babak.mehran@uregina.ca](mailto:babak.mehran@uregina.ca)

Qiang Meng

National University of Singapore, Singapore, [ceemq@nus.edu.sg](mailto:ceemq@nus.edu.sg)

Jagath Munasinghe

University of Moratuwa, Sri Lanka, [jagathnm@gmail.com](mailto:jagathnm@gmail.com)

Ryuichi Shibasaki

National Institute for Land and Infrastructure Management, Japan,  
[shibasaki-r92y2@mlit.go.jp](mailto:shibasaki-r92y2@mlit.go.jp)

T Sivakumar

University of Moratuwa, Sri Lanka. [siva25@gmail.com](mailto:siva25@gmail.com)

Upali Vandebona

University of New South Wales, Australia, [upali.vandebona@gmail.com](mailto:upali.vandebona@gmail.com)

Daisuke Watanabe

Tokyo University of Marine Science and Technology, Japan,  
[daisuke@kaiyodai.ac.jp](mailto:daisuke@kaiyodai.ac.jp)

Rohan Wickramasuriya

University of Wollongong, Australia, [rohan@uow.edu.au](mailto:rohan@uow.edu.au)

Prem Samaranayake

University of Western Sydney Australia [p.samaranayake@uws.edu.au](mailto:p.samaranayake@uws.edu.au)

Matiur Rahman

University of Calgary [matiurbuet02@gmail.com](mailto:matiurbuet02@gmail.com)

Ravin Thilakaratne

University of Calgary [rs.thilakaratne@gmail.com](mailto:rs.thilakaratne@gmail.com)

## TABLE OF CONTENTS

	Keynote Speech 1
<b>International Cooperation in Transportation Research in Asia: Experience of the Eastern Asia Society for Transportation Studies</b>	
Prof. TETSUO YAI, <i>Professor, Tokyo Institute of Technology, President of Eastern Asia Society for Transportation Studies (EASTS)</i>	
	Keynote Speech 2
<b>Recent Industry Initiatives for R&amp;D in Sri Lanka</b>	
Dr. Tilak Siyambalapitiya, <i>Energy Consultant, Resource Management Associates (Pvt) Ltd, Sri Lanka</i>	
	Keynote Speech 3
<b>Journey to Zero Road Fatalities and Beyond-</b>	
Mr. Gayan Fernando, <i>Head of Safety, Lafarge Holcim, Sri Lanka</i>	
	Invited Paper 1
<b>Introduction of Urban Freight Survey in Tokyo Metropolitan Area</b>	
Prof. Naohisa Okamoto, <i>Professor, University of Tsukuba, Secretary General of Eastern Asia Society for Transportation Studies (EASTS)</i>	
<i>TRANSPORT POLICY</i>	
<b>User Rights in Passenger Transport</b>	<b>3</b>
Maheshika M. Sakalasuriya & Amal S. Kumarage	
<b>Use of Stated Preference Survey to Determine Design Parameters of a Rideshare System: A Case Study from Sri Lanka</b>	<b>7</b>
Thilina Rathnayake & Thillaiampalam Sivakumar	
<b>Developing a Fare Index for Para Transit (The Case of Urban Three-Wheeler Taxi service in Sri Lanka)</b>	<b>11</b>
Pasan K. Kevitiyagala & Yapa Bandara	
<i>TRANSPORT MODELLING</i>	
<b>An Application of Applying Agent Based Modelling to Explore the Complexity of Public Recreational Places: Case Study: Weras Ganga Public Park, Sri Lanka</b>	<b>17</b>
Sonali Herath & Chathura De Silva	
<b>An Assessment of Mobile Network Big Data Based Insights for Transport Planning in Sri Lanka</b>	<b>21</b>
M. K. D. T. Maldeniya, Sri Ganesh Loganathan & Amal S Kumarage	
<i>TRANSPORT PLANNING</i>	
<b>A Network Centrality Application: Examination of Structural Coherence of Colombo Road Network</b>	<b>27</b>
Amila Jaysinghe & Chathura De Silva, Kazushi Sano & Hiroaki Nishiuchi	

<b>Travel Characteristics of Low Income Households in Western Province, Sri Lanka</b> Thivya P. Amalan	<b>31</b>
---	-----------

*PUBLIC TRANSPORT*

<b>Introduction of an Integrated Engineering Solutions to ease the Rapidly Increasing Traffic Condition in Main City Centres: A Case Study of Traffic Simulation at Main Network with Proposed Rajagiriya Flyover</b> Krishani R. Perera, Tissa U. Liyanage & Sanuja Seneviratne	<b>37</b>
<b>Bus Passenger Demand Analysis in Seven Major Corridors of Western Province</b> Thivya P. Amalan & Tissa U. Liyanage	<b>41</b>
<b>Effects on Passengers due to Long Dwelling Time at Bus Halt: A Case Study from Sri Lanka</b> Upeka Rangala & Thillaiampalam Sivakumar	<b>45</b>

*URBAN TRANSPORT*

<b>Studying the Public Transport User Preferences in a city and the People's Willingness to Shift to Metro: The Case of Jaipur</b> Abha Singh & Manoranjan Parida	<b>51</b>
<b>Reclaiming Urban Streets in Developing Nations through Ciclovía</b> Pranati Awasthi & Manoranjan Parida	<b>55</b>
<b>Strategic Interventions for Improving Transportation in Kandy City</b> Amal S. Kumarage, I. M. S. Sathyaprasad & Janaka Weerawardana	<b>59</b>

*RAILWAY TRANSPORT*

<b>Increasing Use of Railways for the Transport of Petroleum Products in Sri Lanka</b> W. K. M. S. Amarasinghe & Amal S Kumarage	<b>65</b>
---	-----------

*ROAD SAFETY*

<b>Development of Relationships between Traffic Volume, Number of Accidents and Road Infrastructure Improvements</b> Chamath Nalaka & Thillaiampalam Sivakumar	<b>71</b>
<b>Development of a GIS based Traffic Accident and Road Database Management System</b> Chathura J. Karunarathna & T. M. Rangerasu	<b>75</b>
<b>Risk Factors of Motorcycle Crashes in Sri Lanka</b> Niranga Amarasinghe	<b>79</b>

*ROAD TRANSPORT OPERATIONS*

- Factors Influencing a Shift towards Carpooling in Western Province, Sri Lanka** 85  
Wijekoon P. Anjana & Waidyasekara V. Tharanga
- An Analysis of Methodologies for Solving Green Vehicle Routing Problem: A Systematic Review of Literature** 89  
P. I. N. U. Cooray & Thashika D. Rupasinghe
- Application of GPS Vehicle Tracking Technology in Sri Lankan Supply Chains** 93  
Rusirini Fernando & Nishal A. Samarasekera

*FREIGHT TRANSPORT*

- A Study on Environmental Sustainability Policies in the Road Freight Transportation Industry in Sri Lanka** 99  
E. M. Dinesha Hemamali Ekanayake & Nishal A. Samarasekera
- The Development and Implementation of an Extended Transport Management System (ETMS)** 103  
S. Madurapperuma, L. J. Ebert & S. Dissanayake

*AIR TRANSPORT*

- Evaluating the Potential of Mattala Rajapaksa International Airport (MRIA) to have a Competitive Edge as the Second International Airport in Sri Lanka** 109  
H. K. Sameera Prasani & W. W. A. Shamini Fernando

*LOGISTICS*

- Emerging Opportunities in Sri Lanka's Third Party Logistics Space** 115  
Gayani De Alwis

*MARITIME TRANSPORT*

- Use of the Baltic Dry Index as a Leading Economic Indicator to Predict the Asian Share Market Performance** 121  
C. Akalanka Samarasena & Indika Sigera
- The Benefits of Container Exchange between Carriers: A Case Study** 125  
Lalith Edirisinghe & Jin Zhihong
- Skill Requirement for the Realisation of Maritime Hub Status in Sri Lanka** 129  
M. H. S Dilrukshi, & I. W. Rathnayaka

*SUPPLY CHAIN PERFORMANCE*

- Evaluation of Fresh Vegetable Supply Chain Structure and its Performance** 135  
J. R. A. Piyumali & Pradeepa Jayaratne

**Assessing the Impact of Global Outsourcing and Global Offshoring over the Upstream Supply Chains of Apparel Industry: A Sri Lankan Context** **139**  
Inshi Perera & Pradeepa Jayaratne

**Managing Supply Chain Transformation Projects in the Manufacturing Sector: Case based Learning from Sri Lanka** **143**  
Niles Perera, Amila I. G. Thibbotuwawa, C. Rajasooriyar & P. T. Ranil Shanaka Sugathadasa

*PROCUREMENT MANAGEMENT*

**A Decision Support Model to Select Suppliers in Apparel Industry in Sri Lanka** **149**  
Chami Keerthisinghe & Deepthi Wickramarachchi

**E-procurement Awareness and Adaptation: A Sri Lankan Perspective** **153**  
C. Rajasooriyar & H. Niles Perera

**Impact of Information Sharing on Supplier-Buyer Relationship and Supply Chain Performance** **157**  
Roshani Wickramanayake & Pradeepa Jayaratne

*SUPPLY CHAIN RISK AND GOVERNANCE*

**A Case Study Approach to Explore Supply Chain Disruptions in Sri Lankan Retail Supermarket Industry** **163**  
M. A. D. S. Nalaka & P. T. R. S. Sugathadasa

**Identifying the Risk Factors of Global Sourcing in Large Scale Apparel Industry in Sri Lanka** **167**  
H. K. D. S. Sandamalika & Pradeepa Jayaratne

**Use of Information & Communication Technology Applications in Supply Chain Management: The Case of Small & Medium Scale Manufacturing Enterprises in Sri Lanka** **171**  
Jayani I. Sudusinghe & Nishal A. Samarasekera

*WAREHOUSE & INVENTORY MANAGEMENT*

**Enhancing the Efficiency of Inventory Management in FMCG industry** **177**  
Gihan D. Vidanapathirana & Pradeepa Jayaratne

**Methodology to Enhance Warehouse Performances Using Lean Concepts:** **181**  
Uthpalee Hewage