

**LEAN ENABLED MATERIAL PROCUREMENT
PROCESS TO MINIMIZE DISPUTES IN EXPRESSWAY
CONSTRUCTION PROJECTS IN SRI LANKA**

Manathunga Mudiyansele Chameera Dulanja Bandara Manathunga

(209184N)

Master of Science in Construction Law and Dispute Resolution

Department of Building Economics
Faculty of Architecture

University of Moratuwa
Sri Lanka

November, 2025

**LEAN ENABLED MATERIAL PROCUREMENT
PROCESS TO MINIMIZE DISPUTES IN EXPRESSWAY
CONSTRUCTION PROJECTS IN SRI LANKA**

Manathunga Mudiyansele Chameera Dulanja Bandara Manathunga

209184N

Thesis/Dissertation submitted in partial fulfilment of the requirements for the degree.
Master of Science in Construction Law and Dispute Resolution

Department of Building Economics
Faculty of Architecture

University of Moratuwa
Sri Lanka

November, 2025

DECLARATION

I declare that this is my own work and this thesis/dissertation does not incorporate without acknowledgement any material previously submitted for a degree or diploma in any other University or Institute of higher learning and to the best of my 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. I retain the right to use this content in whole or part in future works (such as articles or books).

.....

Manathunga M.M.C.D.B

.....

Date:

The above candidate has carried out research for the PhD/MPhil/Master's thesis/dissertation under my supervision. I confirm that the declaration made above by the student is true and correct.

.....

Dr. Tharusha Ranadewa

Signature of the Supervisor

.....

Date:

DEDICATION

**To my loving family and friends,
For your unwavering support and endless encouragement**

ACKNOWLEDGEMENT

I am expressing my heartfelt gratitude to each and every one who support and encourage for its success.

First and foremost, I extend my sincerest gratitude to my dissertation supervisor, Dr. Tharusha Ranadewa, for her exceptional guidance, support, and encouragement. Her expertise and knowledge were highly supportive in voyage to face the challenges of this research, and without her mentorship, this work would not have reached fruition.

I am also deeply grateful to the Head of the Department, Ch. QS Prof. (Mrs.) Anuradha Waidyasekara, as well as the academic and non-academic staff of the Department of Building Economics, for their invaluable assistance throughout my research. The resources and guidance provided by the department were vital during the work. A special note of thanks goes to the University of Moratuwa library staff for their unwavering cooperation.

My heartfelt appreciation goes to the industry professionals who generously contributed their time and expertise, enabling the successful collection of data. Their willingness to share their knowledge and experiences was pivotal to this study.

My beloved family for their endless encouragement, and sacrifices. I also wish to thank my dear friends, whose unwavering support, honest advice, and constant encouragement kept me inspired throughout this journey.

Finally, I acknowledge everyone who has support me during this endeavour. Your kindness and guidance have made this achievement possible.

Lean enabled material procurement process to minimize disputes in expressway construction projects in Sri Lanka

Expressway construction projects in Sri Lanka are facing numerous disputes during the material procurement process. These disputes arise from various causes, including largely number of uncontrollable factors such as inflation and weather conditions; behavioural factors such as lack of transparency and political interference; resource-related issues such as supplier constraints, inventory control practices, and material shortages; as well as documentation-related shortcomings. Therefore, this study aims to develop a lean enabling framework to minimize disputes in material procurement process of expressway construction projects in Sri Lanka. The research based on a mixed-methods approach, beginning with a comprehensive literature review to establish the theoretical foundation. Primary data has collected through a questionnaire survey with 96 industry professionals, with sample validity ensured through saturation techniques, and supplemented by semi-structured interviews with 10 experts who were part of the Central Expressway project. Quantitative data has analysed using the relative importance index (RII) to identify and prioritize identified (11) disputes and (15) causes for disputes in the material procurement process. Whereas qualitative data underwent through content analysis.

The study reveals how lean principals can address identified causes for disputes, while giving the link between causes and disputes related to material procurement in expressway construction. Findings demonstrate that lean implementation in materials procurement process in expressway projects provides multiple benefits to all the stakeholders of the projects. Based on these insights, the research develops a comprehensive framework that integrates lean strategies to minimize the disputes in the material procurement process of Expressway construction project. The developed framework provides actionable guidance for industry professionals, offering a structured approach to dispute minimization in Sri Lankan infrastructure sector. The study makes significant contributions to both academic knowledge and practical application, presenting a framework for improving procurement processes in expressway projects, with potential adaptability to similar emerging economies challenges.

Keywords: Disputes, Expressway projects, Lean construction, Material procurement, Sri Lanka.

TABLE OF CONTENTS

DECLARATION	i
DEDICATION	ii
ACKNOWLEDGEMENT	iii
ABSTRACT	iv
Table of contents	i
List of Figures	iv
List of Tables	v
List of Abbreviations	vi
List of Appendices	viii
CHAPTER 1	1
1 INTRODUCTION	1
1.1 Background	1
1.2 Problem statement.....	3
1.3 Aim.....	4
1.4 Objectives.....	4
1.5 Scope of study	4
1.6 Research methodology	4
1.7 Chapter breakdown	5
1.8 Chapter summary	5
CHAPTER 2	7
2 LITERATURE REVIEW	7
2.1 Introduction	7
2.2 The road construction in Sri Lanka.....	7
2.2.1 The expressway construction	9
2.2.2 Problems in expressway construction projects	10
2.3 Material procurement process in construction	11
2.3.1 Causes for disputes in material procurement in expressway construction projects.	12
2.3.2 Waste in procurement process in expressway construction projects .	14
2.4 Lean construction	16
2.4.1 Lean principles	16

2.4.2	Lean tools and techniques	17
2.4.3	Lean wastes	20
2.4.4	Benefits of implementing lean for material procurement in expressway construction project.....	21
2.4.5	Barriers to implement lean for material procurement in expressway construction projects	24
2.4.6	Strategies to minimise disputes material procurement in expressway construction projects	25
2.5	Conceptual framework	27
2.6	Chapter summary	29
CHAPTER 3	30
3	RESEARCH METHODOLOGY	30
3.1	Introduction.....	30
3.2	Research approach	30
3.2.1	Quantitative research approach.....	30
3.2.2	Qualitative research approach.....	30
3.2.3	Mixed-methods research approach	31
3.3	Justification for the selected research approach for this study.....	31
3.4	Research techniques	31
3.5	Data collection	31
3.5.1	Questionnaire survey.....	32
3.5.2	Semi-structured expert interviews.....	32
3.6	Data analysis	33
3.6.1	Relative Importance Index	33
3.6.2	Content analysis	33
3.7	Research process	34
3.8	Chapter summary	34
CHAPTER 4	36
4	ANALYSIS AND RESEARCH FINDINGS	36
4.1	Introduction.....	36
4.2	Questionnaire survey.....	36
4.2.1	Objectives of the questionnaire survey	36

4.2.2	Demographic analysis of the respondents in the questionnaire survey	36
4.2.3	Findings of questionnaire survey	39
4.3	Expert interviews	41
4.3.1	Objectives of expert interviews.....	41
4.3.2	Design of the interview guideline	42
4.3.3	Details of interviewees.....	42
4.3.4	Findings of expert interviews.....	43
4.4	Mapping the findings	49
4.5	Benefits of lean implementation to material procurement process in expressway construction projects.....	50
4.6	Strategies to minimise disputes in material procurement process in expressway construction projects in Sri Lanka.....	53
4.7	Framework	57
4.8	Further Discussion	59
4.9	Chapter Summary.....	61
	CHAPTER 05	62
5	CONCLUSION AND RECOMMENDATION	62
5.1	Introduction	62
5.2	Overview of research and conclusions drawn from the study	62
5.3	Recommendations	65
5.4	Limitations of the research.....	67
5.5	Further research directions.....	68
5.6	Chapter summary	68
	REFERENCES.....	69
6	REFERENCES.....	69

LIST OF FIGURES

Figure	Description	Page
Figure 2-1	Problem tree for transport, and information and communication technology (road transport).....	8
Figure 2-2	Key stages of materials logistics management in construction projects	112
Figure 2-3	Cause and effect diagram for construction waste common problems in egypt.....	14
Figure 2-4	Conceptual framework	28
Figure 3-1	Research process	34
Figure 4-1	Classification of respondents	37
Figure 4-2	Educational qualifications	37
Figure 4-3	Experience in construction industry	388
Figure 4-4	Experience in construction industry	38
Figure 4-5	Disputes related to the material procurement process.....	39
Figure 4-6	Framework.....	58

LIST OF TABLES

Table	Description	Page
Table 2-1	List of LC tools.....	19
Table 2-2	Benefits of implementing lean for material procurement.....	22
Table 2-3	Barriers to implement lean for material procurement in expressway construction projects	24
Table 2-4	Strategies to implement lean for material procurement in expressway construction projects	26
Table 4-1	Causes for disputes in material procurement process.....	40
Table 4-2	Details of interviewees	42
Table 4-3	Disputes and its causes in material procurement process.....	44
Table 4-4	Relationship between causes of disputes and lean principles proposed for resolute disputes	48
Table 4-5	Mapping the findings.....	49
Table 4-6	Benefits of lean implementation to material procurement process ...	51
Table 4-7	Strategies to minimise disputes in material procurement process	54

LIST OF ABBREVIATIONS

ADB	:	Asia Development Bank
BIM	:	Building Information Modelling
CBSL	:	Central Bank of Sri Lanka
CE	:	Concurrent Engineering
DHM	:	Daily Huddle Meeting
EIA	:	Environmental Impact Assessment
FMEA	:	Failure Mode and Effect Analysis
FRS	:	First Run Studies
FSQS	:	Fail-Safe for quality and safety
IPD	:	Integrated Project Delivery
JIT	:	Just In Time
KAIZ	:	Kaizen
KAN	:	Kanban
LC	:	Lean Construction
LofB	:	Line of Balance
LPS	:	Last Planner System
MOD	:	Prefabrication/Modular PF
NVAA	:	Non-Value-Added Activities
PULL	:	Pull approach
PY	:	Poka Yoka
QS	:	Quantity Surveyor
RDA	:	Road Development Authority
RII	:	Relative Importance Index
RS	:	Sri Lankan Rupees
SBD	:	Set Based Design
SP	:	Standardized Process
SS	:	Six Sigma

TOC	:	Theory of Constraints
TVD	:	Target Value Design
VM	:	Visual Management
VSM	:	Value Stream Mapping

LIST OF APPENDICES

Appendix	Description	Page
Appendix - A	Sample Questionnaire	82
Appendix – B	Sample Interview Guideline	88