STATUS OF SOCIO – TECHNICAL DESIGNS INCORPORATION FOR ROAD REHABILITATION PROJECTS

MASTER OF SCIENCE



G.N. JAYATUNGA Department of Civil Engineering University of Moratuwa

July 2013

STATUS OF SOCIO – TECHNICAL DESIGNS INCORPORATION FOR ROAD REHABILITATION PROJECTS

By

G. N. JAYATUNGA

Supervised by



The research was submitted to the Department of Civil Engineering of

the University of Moratuwa In partial fulfillment of the requirement for the

Degree of Master of Science

Department of Civil Engineering University of Moratuwa July 2013

Declaration

I hereby affirm that this research report is an outcome of my own efforts to the best of my knowledge and it contains my own work done for the fulfillment of the requirement for the higher Degree of Master of Science in Construction Project Management. It does not include any written material previously submitted for the award of any preliminary degree, higher degree or diploma of a university or any other institution of higher education, or published by any other person or institution of higher education, or published by any other person or institution of higher education, or published institution except where acknowledgement and references are made in the text.

G. N. Jayatunga Department of Civil Engineering University of Moratuwa, Sri Lanka. University of Moratuwa, Sri Lanka. Electronic Theses & Dissertations WWW.lib.mrt.ac.lk

I certify that the above statement is correct

Dr. L. L. Ekanayake Construction Management Unit Department of Civil Engineering July 2013

Acknowledgement

This may be a gratitude for those who offered me encouragement, valued cooperation, advice and assistance for achieving my objectives.

I express my deepest gratitude to my supervisor Dr. Lesly Ekanayake for the invaluable guidance offered for the success of this research, panel members Mr. R.M. Amarasekara (Additional General Manager – RDA) and Prof. Mrs. C. Jayasingha for giving valuable comments and observations.

I would like to extend my grateful thanks to the Construction Management Unit, Department of Civil Engineering, University of Moratuwa for organizing and conducting this course and professional lecturers who participated from the university and outside.

I offer my sincere thanks to Eng. S. Weeratunga for recommending me to the University of Moratuwa to follow this course, Eng. M. S. M. Iqbal by giving prompt and invaluable support and cordial assistance to achieve successful completion of this research and Mr. K. Jinapala (Sociologist) by helping me and making me aware of socio features tions

www.lib.mrt.ac.lk

I, very much appreciate my Employer, Road Development Authority for granting me official study leave, despite the busy working schedule of the organization and monetary assistance and further, I convey my thanks to all employees who offered their dedication during my absence.

I am grateful to my parents who showed continuous interest in my studies throughout my career.

Very special thanks should go to my husband who gave continuous encouragement and moral support throughout my study.

The time, I spent with my two kids Thisum and Penuja, was considerably reduced due to the involvement with the study, the research work and in the preparation of this report. I highly appreciate their patience and promise to make up the lost time.

The growing transport needs within the country continuously demand the necessity of maintenance of the road network in a satisfactory level. Therefore, several development projects are always carried out within the country and the government has also given priority to the development of infrastructure.

Evidence at hand shows that launched and completed road projects have developed certain difficulties to the communities on either side of the road, road end users and to the society.

The facts revealed that designs of the road construction industry are always focused into technical aspects rather than considering its socio perspectives. It is necessary to carry out a survey to find out the extent to which the factors would have influenced. Arising out of the literature review of this research, thirteen (13) socio factors that affect the end users of the projects have been selected to study under this research.

The collecting of data on thirteen numbers of specior factors, was carried out under two methods namely Road conditions were fact Question hires survey for ster trainbers of the selected sample roads.

Under this research, analysis of the collected data reveal that past completed projects have not considered the socio aspects at any stage of the project such as planning, designing, and implementing stage.

According to the analysis of data of sample projects they can be catogarised into good, fair and poor condition. Out of these ten projects nine projects are in poor condition and one is in fair condition.

Therefore, the objective of this research is to establish an improvement method by the participation of road actors such as infrastructure owners, experts in road construction industry, designers and road users.

Based on the literature review and analysis of data, the method for improvement of socio aspects has been deduced to be considered within the initial stage of the project by participating road actors.

TABLE OF CONTENTS

List of Tables	(iv)
List of Graphs	<u>(</u> v)
List of Appendices	(vi)
Abbreviations	_(vii)

CHAPTER 01 - INTRODUCTION

1.1 Background	01
1.2 Significance of the study	
1.3 Problem Statement	02
1.4 Objectives	03
1.5 Scope and Limitation	03
1.6 Methodology of Study	03

CHAPTER 02 – LITERATURE REVIEW

2.1 History of the Socio- Technical Designs	05
2.2 Scope of the Socie Technical Design towards Road Projects	
2.2.1 Main work Progress phases WWW.lib.mrt.ac.lk	06
2.3 The Evaluation of Socio – Technical concepts	07
2.4 Seminars	11
2.5 'Rules' of play for Innovations	11
2.6 The Required Global Concepts Development of the Road	11
2.7 Dominant characteristics of the Socio Technical designs	11
2.7.1 Reliable Infrastructure	12
2.7.1.1 Directions for Solutions	13
2.7.2 Green Infrastructure	16
2.7.2.1 Directions for Solutions	17
2.7.3 Safe and smart Infrastructure	20
2.7.3.1 Directions for Solutions	21
2.7.4 Human Infrastructure	25
2.7.4.1 Directions for Solutions	26
2.8 Summary	

TABLE OF CONTENTS

CHAPTER 03 – METHODOLOGY OF STUDY

3.1 Selected Factors for Research	30
3.1.1 Definition of Factors	30
3.1.1.1 Road Alignment	30
3.1.1.2 Road Shoulders	31
3.1.1.3 Road Safety and Road Markings	32
3.1.1.4 Disposal of Surplus Material	33
3.1.1.5 Level Difference	<u>34</u>
3.1.1.6 Drain Patterns	34
3.1.1.7 Flooded Areas	34
3.1.1.8 Black Spots	35
3.1.1.9 Structures of the Road	36
3.1.1.10 Protection Walls	37
3.1.1.11 Land Acquisition	38
3.1.1.12 High Noise Situations University of Moratuwa, Sri Lanka.	41
3.1.1.13 Risk Mitigating or Avoidable plan and other Burden Relevant to the	
Road www.lib.mrt.ac.lk	43
3.2 Methods used to collect the data	46
3.2.1 General	46
3.2.2 Road Condition Survey (RCS)	_46
3.2.3 Questionnaire Survey	47
3.3 Categorizing of Roads Based on Socio Factors	47
3.4 Summary	47
CHAPTER 04 – ANALYSIS OF DATA	
4.1 Analysis of collected Data	49
4.2 Results of Road Condition Survey	
4.3 Results of Questionnaire Survey	57
4.4 Analysis of Results	_66
4.5 Summary	69
CHAPTER 05 - CONCLUSIONS	
5.1 Conclusions	70
Status of Socio – Technical Designs incorporation for Road Rehabilitation Projects	ii

TABLE OF CONTENTS

5.2 Improvement Methods	70
5.2.1 – Phase I (Planning Stage)	71
5.2.2 – Phase II (Designing Stage)	71
5.3 Designing of Models	72
5.3.1 Stages of Designing of a Model	_72
5.4 Phase III (Implementing Style)	73
5.5 Further Recommendations for Future Research	<u>74</u>
Reference List	75



University of Moratuwa, Sri Lanka. Electronic Theses & Dissertations www.lib.mrt.ac.lk

LIST OF TABLES

CHAPTER 01

Table – 1.1 Road Network in Sri Lanka	01
CHAPTER 02	
Table – 2.1 The Identified Vision in Research Areas	12
Table – 2.2 Reliable Infrastructure	15
Table – 2.3 Green Infrastructure	19
Table – 2.4 Safe and Smart Infrastructure	23
Table – 2.5Human Infrastructure	28

CHAPTER 03

No Table

CHAPTER 04

Table – 4.1 Highlevel Road – Colombo University of Moratuwa, Sri Lanka.	48
Table – 4.2 Trincomate – Baticalea Road Theses & Dissertations	49
Table – 4.3 Rathmaldeniya Roadyw.lib.mrt.ac.lk	
Table – 4.4 Welimaluwa – Gonakumbura Road	51
Table – 4.5 Kotamulla – Karawita Road	
Table – 4.6 Muwagama – Niralgama Road	53
Table – 4.7 Hakmana – Walasmulla Road	54
Table – 4.8 Kamburupitiya – Kirinda Road	55
Table – 4.9 Akkuressa – Kamburupitiya Road	55
Table – 4.10 Galle – Deniyaya – Madampe Road	56
Table – 4.11Results of Questionnaire Survey	63
Table – 4.12 Summary of Analysed Results of both methods	65

CHAPTER 05

No Table

LIST OF GRAPHS

Graph 4.1 - % value of achievement of Socio Factors of Sample Roads._____66



University of Moratuwa, Sri Lanka. Electronic Theses & Dissertations www.lib.mrt.ac.lk

LIST OF APPENDICES

Appendix 1 - Format of Road Condition Surve	ey 76
Appendix 2 – Format of Questionnaire survey	



University of Moratuwa, Sri Lanka. Electronic Theses & Dissertations www.lib.mrt.ac.lk