# QUALITY MANAGEMENT IN STATE SECTOR BUILDING PROJECTS

## Vasantha Ranjanie de Silva

### **Department of Building Economics**



Moratuwa

Sri Lanka

පුස්තුකාලය මොරටුව විශ්ව විළාසලය. ශු ලංකාව මොරටුව 39 "98" 35.010:31

120 (20) (20)

Submitted in Partial Fulfillment of the Requirement of the Degree of

Master of Science in Project Management

November 1998

RATION S

# TABLE OF CONTENTS

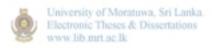
	page
LIST OF FIGURES	vii
LIST OF TABLES	viii
ACKNOWLEDGEMENT	ix
ABSTRACT	x
CHAPTER 1	1
1.0. INTRODUCTION	1
<ul> <li>1.1. Background</li> <li>1.2. Research Problem Lectronic These &amp; Dissertations</li> <li>1.3. Objectives</li> <li>1.4. Hypotheses</li> <li>1.5. Methodology</li> <li>1.6. Scope and Limitations</li> <li>1.7. Significance of the study</li> <li>1.8. The Structure</li> </ul>	1 4 5 6 7 9 10 12
CHAPTER 2	14
2.0 QUALITY - DEFINITIONS	14
2.1. Introduction	14
2.2. Alternative Definitions of Quality	15
<ul> <li>2.2.1. The aesthetic definition of quality</li> <li>2.2.2. The legal definition of quality</li> <li>2.2.3. The functional definition of quality</li> <li>2.2.4. Quality Control. Assurance and Quality Management</li> </ul>	15 16 16

2.3. The views of quality 'gurus'	21
<ul><li>2.3.1.The views of Juran, Crosby, Deming and Garwin.</li><li>2.3.2.The views on quality in the more recent times.</li><li>2.3.3.Trends in the pursuit of quality - ISO 9000</li></ul>	21 24 25
2.4. Application of the concept of quality to building projects.	29
2.4.1.Uniqueness of a building project.	29
2.5. Conclusions	30
CHAPTER 3	32
3.0. MANAGING QUALITY	32
3.1. Introduction	32
3.2. The Concept of quality management	32
<ul><li>3.2.1. Product, process and project</li><li>3.2.2. The meaning of quality in the building process</li></ul>	32 35
3.3. Application of the concept of quality management	36
3.3.1.Distinct stages of a building project 3.3.2.Briefing, designing and specifying 3.3.3.Construction	36 38 40
3.4. Problems in implementation of quality management	41
3.4.1.Interface between parties	41
<ul> <li>3.4.2 The role of the client</li> <li>3.4.3. The role of the consultant</li> <li>3.4.4. The role of the contractor</li> <li>3.4.5. Effects of the procurement system on quality</li> <li>3.4.6. Fragmented responsibility</li> <li>3.4.7. Cultural attitude</li> </ul>	43 44 47 49 50 51

<ul><li>3.5.Maintaining quality Principles throughout the building project</li><li>3.6.A conceptual framework for managing quality</li><li>3.7.Problems in meeting the objectives of the framework</li><li>3.8.Conclusions</li></ul>	t 52 54 56 58
CHAPTER 4	60
4.0. DATA COLLECTION AND RESEARCH METHODOLOGY	60
4.1. Introduction	60
4.2. Literature review	60
4.3. Development of the questionnaire	61
4.4. Selection of respondents for the questionnaire survey and data collection	63
4.5. Data analysis	64
4.6. The case studies	65
4.7. Limitations	67
CAHAPTER 5 University of Moratuwa, Sri Lanka. Electronic Theses & Dissertations www.lib.mrt.ac.lk	68
5.0. DATA ANALYSIS AND THE OUTCOME OF THE RESEAR	<b>CH</b> 68
5.1. Introduction	68
5.2. Results of the questionnaire survey	68
5.2.1. Importance of quality	69
5.2.2. Main quality problems	72
5.2.3. Causes of quality problems and their prevention	74
5.2.4. Quality management as a solution	77
5.2.5. Contribution of parties towards quality	78
5.2.6. Awareness of ISO 9000	79
5.3. Conclusions	81

CHAPTER 6	83
6.0. CASE STUDIES	83
6.1. Introduction	83
6.2. General project information	84
6.3. Advanced Technical Innstitute at Labuduwa, Galle	85
6.3.1. Introduction	85
6.3.2. Quality problems	85
6.3.3. Findings	90
6.4. Examinations Centre at Battaramulla	92
6.4.1.Introduction	92
6.4.2.Quality problems	92
6.4.3.Findings	95
6.5. Development of the Sugathadasa stadium	98
6.5.1.Introduction Electronic Theses & Dissertations	98
6.5.2.Quality problems	98
6.5.2. Quanty problems	101
6.5.3.Findings	101
6.6. Research findings on quality problems	102
6.7. Conclusions	109
CHAPTER 7	112
7.0. CONCLUSIONS	112
7.1. The Summary	112
7.2. Main conclusions	114
7.3. Limitations of the study	116
REFERENCES	118
BIBLIOGRAPHY	120

PPENDIX 1 - Sample questionnaire	123	
APPENDIX 2 - Statistical analysis	127	
APPENDIX 3 - Organisation chart: State Engineering Corporation	141	





# LIST OF FIGURES

	page
FIG. 1.0 - Client objectives; weighting factors	17
FIG. 2.0 - The Conceptual framework	55



### LIST OF TABLES

	page
TABLE 1.0 - Quality problems & ISO 9000	26
TABLE 2.0 - Questionnaire responses based on the three categories	64
TABLE 3.0 - Categories in the questionnaire	69
TABLE 4.0 - Category 1 - Importance of quality to participants	69
TABLE 5.0 - Degree of importance of quality	70
TABLE 6.0 - Category 2 - Main quality problems	72
TABLE 7.0 - Category 3 - Causes of quality problems and their prevention	74
TABLE 8.0 - Category 4 - Quality management as a solution	77
TABLE 9.0 - Category 5 - Contribution of various parties towards quality	78
TABLE 10.0 - Category 6 - Awareness of ISO 9000	80
TABLE 11.0 - General project information	84
TABLE 12.0 - Frequency of occurrence of quality problems in Project 1	91
TABLE 13.0 - Frequency of occurrence of quality problems in Project11	97
TABLE 14.0 - Frequency of occurrence of quality problems in Project111	102

### **ACKNOWLEDGEMENTS**

My thanks are due to:

Mrs C. Weddikkara, Head, Department of Building Economics, University of Moratuwa.

My supervisors, M/s Michael Hancock, Chatura Ranaweera and Dr Shanaka de Silva.

Course Coordinators, M/s P.E.O. Oruko and Dr Srinath Perera.

All questionnaire respondents and interviewees.

Mr P. Dias of Department of Mathematics and Statistics, Sri Jayawardanapura University.

and last but not least,

My husband Lal.

#### **ABSTRACT**

This study is an investigation of the problems of quality and their prevention in building projects with particular reference to the state sector. The study identifies quality problems associated with state sector building projects. It then analyses the reasons for these quality problems and proposes possible solutions based firstly on theory and then on empirical data collected from a questionnaire survey and three case studies. Five hypotheses on quality problems are formulated and tested using this data.

The approach of the study is to describe how the fundamental philosophy of quality and quality management relate to a building project throughout its life cycle. An idealised conceptual framework that achieves quality is mapped to existing building process showing where change is required.

The emphasis of the research is on the two main stages of a building project namely the preconstruction and construction stages, as it is in these two particular stages of a building project, clients' needs and expectations have to be determined, interpreted for construction and finally constructed.

It is hoped that the study will be particularly useful to clients, consultants and contractors as a guide in the area of achieving quality, as it sets down principles for the application of quality principles in a building project.