

Copyright is owned by the Author of the thesis. Permission is given for a copy to be downloaded by an individual for the purpose of research and private study only. The thesis may not be reproduced elsewhere without the permission of the Author.

# **AN INVESTIGATION INTO THE USE OF QUALITY MANAGEMENT TECHNIQUES IN NZ IT PROJECTS**

A thesis presented in partial fulfilment of the  
requirement for the degree of

MASTER OF SCIENCE

in Information Systems  
at Massey University, Albany campus, New Zealand

RuiLin (lynn) Xu  
2006

## **ACKNOWLEDGEMENTS**

I would like to thank my project supervisor, Mr Dave Wilton, for his guidance throughout the whole one and half years.

I am also grateful to my colleagues, Ramesh Lal, your patience and support throughout the whole year. Thank you for all the books and other information you collected for me to finish my thesis.

Thank Chris Stodart and Sam Alexandra, without you check all my grammar, nobody can understand what am I talking about.

Thanks to my family for your support all the way through my life, even if you did not really understand what it was all about. Thanks heaps for the encouragement and concern.

## **ABSTRACT**

The risks in an IT project are very high both because of its complexity and also because the context of rapidly-developing technology leads to a high degree of uncertainty. IT projects should have comprehensive formal quality management fully integrated within all aspects of project management.

A review of the quality management in IT project literature suggests, customer-focused TQM is now synonymous with good management. TQM combines the use of computerised data collection and statistical experimentation with a focus on teamwork, group participation and a culture of continuous improvement in operating systems (Robert, 1993).

Using the survey methodology and through two case studies, qualitative data was gathered to develop a model of quality management implementation process in New Zealand.

**Key words:** Quality, Total Quality Management (TQM), Quality Control (QC), Quality Assurance (QA), Quality Model.

## Table of Contents

<b>LIST OF TABLES</b> .....	<b>3</b>
<b>LIST OF FIGURES</b> .....	<b>5</b>
<b>INTRODUCTION</b> .....	<b>6</b>
Scope of Quality .....	7
Product Quality .....	9
Process Quality .....	10
Product Quality vs. Process Quality .....	11
IT Project Basic Concepts.....	12
IT Project Management.....	12
IT Project Quality .....	14
Quality Management (QM).....	16
Expected Results.....	18
Research Questions.....	19
<b>LITERATURE REVIEW</b> .....	<b>20</b>
Development of Quality Management.....	20
Quality Assurance (QA) .....	21
Quality Control (QC).....	22
Total Quality Management (TQM).....	22
QC vs. QA vs. TQM.....	24
TQM Main Elements .....	26
<i>Customer Focus</i> .....	27
<i>Continuous Improvement (CI)</i> .....	31
<i>Process Control</i> .....	33
<i>Quality Training</i> .....	36
<i>Employee Empowerment</i> .....	37
<i>Top Management Commitment (Leadership)</i> .....	39
<i>The Management of Culture</i> .....	40
<i>Information System Usage</i> .....	43
<i>Cost of Quality (COQ)</i> .....	44
<i>Quality Management Models</i> .....	46
CMM.....	49
ISO Standards .....	49
TQM vs. ISO 9000.....	51
Malcolm Baldrige Awards.....	52
Other Quality Models .....	53
State of TQM .....	54
TQM in New Zealand.....	56
<i>The Implications of National Politics</i> .....	57
Barriers to Quality Programme Success .....	58
General Lessons on the Process of Establishing TQM.....	61
<b>METHODOLOGY</b> .....	<b>63</b>
Survey .....	63
Case Study (RQ 4).....	70
<b>RESULTS FROM SURVEY</b> .....	<b>72</b>
Discussion of results from survey.....	72
<i>The State of Quality Plan</i> .....	75
<i>The Decision to Change</i> .....	77
<i>Planning the Quality Programme for the IT Project</i> .....	83

<i>Effects of Change</i> .....	86
Hypothesis Tests .....	93
<b>CONCLUSIONS</b> .....	<b>100</b>
Research Question 1 .....	100
Research Question 2 .....	106
<i>Recommendations for Improvement</i> .....	109
Research Question 3 .....	110
Research Question 4 .....	111
<i>NZ Police Integrated National Crime Information System (INCIS) Project</i> .....	111
<i>Summary of interviews key findings:</i> .....	113
<i>Proposing the quality management model</i> .....	115
Summary .....	119
Limitations and Future Research .....	120
<b>REFERENCES</b> .....	<b>121</b>
<b>INDEX</b> .....	<b>129</b>

## LIST OF TABLES

Table 1 Changing View of Quality (Harold 2001) .....	9
Table 2: Contrasting management paradigms (Mohanty and Sethi 1996) .....	23
Table 3: Differences between the QA, QC and TQM .....	26
Table 4: TQM implementation situations depending on sizes (Ghobadian and Gallear 1997) .....	42
Table 5: Comparison of different quality models (Gary 2004) .....	53
Table 6: Hypotheses .....	66
Table 7: Questionnaire structure and relevant supporting reference .....	68
Table 8 .....	72
Table 9 .....	72
Table 10 .....	73
Table 11 .....	73
Table 12 .....	74
Table 13 .....	74
Table 14 .....	74
Table 15 .....	75
Table 16 .....	76
Table 17 .....	76
Table 18 .....	77
Table 19 .....	78
Table 20 .....	78
Table 21 .....	78
Table 22 .....	78
Table 23 .....	79
Table 24 .....	79
Table 25 .....	80
Table 26 .....	80
Table 27 .....	80
Table 28 .....	81
Table 29 .....	81
Table 30 .....	81
Table 31 .....	82
Table 32 .....	82
Table 33 .....	83
Table 34 .....	83
Table 35 .....	84
Table 36 .....	84
Table 37 .....	85
Table 38 .....	86
Table 39 .....	86
Table 40 .....	87
Table 41 .....	87
Table 42 .....	87
Table 43 .....	88
Table 44 .....	88
Table 45 .....	88
Table 46 .....	89

Table 47 .....	89
Table 48 .....	89
Table 49 .....	90
Table 50 .....	92
Table 51 .....	92
Table 52 .....	93
Table 53 .....	94
Table 54 .....	95
Table 55 .....	96
Table 56 .....	97
Table 57 .....	98
Table 58 .....	101
Table 59 .....	103
Table 60 .....	104
Table 61 .....	105
Table 62 .....	106
Table 63 .....	112
Table 64 .....	113
Table 65 .....	113



## LIST OF FIGURES

Figure 1: Project management constraints .....	13
Figure 2: Tasks of QA and QC in quality systems (Battikha 2003).....	25
Figure 3: Three quality dimensions and positioning (Mosad and Torbjörn 2001). ....	30
Figure 4: Interpreting quality definitions (Mireille 2003) .....	31
Figure 5: The salient elements of continues improvement implementation (Ghobadian and Gallear 1997) .....	33
Figure 6: Deming’s Flow Diagram (Spenser 1994) .....	40
Figure 7: Total, Conformance, and Non-conformance Costs per Line of Code (Slaughter et al., 1998, p. 71).....	46
Figure 8: Deming Circle.....	47
Figure 9: A framework for the implementation of TQM in SMEs (Deming, 1986; Ghobadian & Gallear, 1997, p. 158) .....	48
Figure 10: The Structure of the Capability Maturity Model (Mark et al. 1993).....	49
Figure 11: Coverage of ISO 9001, 9002, & 9003 Standards (Fallah 1993) .....	51
Figure 12: System approach to quality management (Battikha 2003) .....	52
Figure 13: Bridging the quality programme implementation chasm.....	61
Figure 14: Research theoretical framework.....	64
Figure 15.....	65
Figure 16: Variables of IT project product quality .....	65
Figure 17: Variables of IT project process quality.....	66
Figure 18: An example of the questionnaire Likert scales.....	68
Figure 19.....	115
Figure 20: TQM implementation and improvement model .....	116
Figure 21.....	117
Figure 22.....	117
Figure 23.....	118
Figure 24.....	118
Figure 25.....	119