A STUDY ON SOFTWARE INDUSTRY ORGANIZATIONAL PERFORMANCE INDICATORS AND INDUSTRY STANDARD ACCREDITATIONS

H. W. H. Malaka

09/9068

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

Master of Business Administration in Information Technology

Department of Computer Science and Engineering

University of Moratuwa

Sri Lanka

December 2010

A STUDY ON SOFTWARE INDUSTRY ORGANIZATIONAL PERFORMANCE INDICATORS AND INDUSTRY STANDARD ACCREDITATIONS

H. W. H. Malaka

09/9068

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

Thesis Submitted in Partial Fulfilment of the Requirements for the Degree of Master of Business Administration

Department of Computer Science and Engineering

University of Moratuwa

Sri Lanka

December 2010

DECLARATION

I declare that this is my own work and this thesis 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.

Also, I hereby grant to University of Moratuwa the non-exclusive right to reproduce and distribute my thesis, in whole or in part in print, electronic or other medium. I retain the right to use this content in whole or part in future works (such as articles or books).

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

…… ……

Signature of the Candidate Date

The above candidate has carried out research for the Masters thesis under my supervision.

…….

Supervisor

(Dr. Chandana Gamage)

COPYRIGHT STATEMENT

I hereby grant the University of Moratuwa the right to archive and to make available my thesis or dissertation in whole or part in the University Libraries in all forms of media, subject to the provisions of the current copyright act of Sri Lanka. I retain all proprietary rights, such as patent rights. I also retain the right to use in future works (such as articles or books) all or part of this thesis or dissertation.

H. W. H. Malaka

05/01/2011

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

ABSTRACT

The demand for the global standings and enhanced technologies in IT industry is growing rapidly. However, in the fulfilment of this requirement, Sri Lanka is faced with problems in meeting the industry demand for trained IT professionals, advanced technologies and expectations on compliance with industry standards.

In Sri Lanka too, software industry is viewed as a major economic driving force therefore, its performance therefore is critical to the national economic development, improvements in technology and in the upgrading of the county's profile as a top software development destination.

For the continued development and for the improved recognition of Sri Lankan software industry, it is important that organizational performance is measured and critically analyzed so that appropriate actions can be taken to improve processes and practices. In view of that objective, the focus of this thesis has been to study the performance indicators used by software industry and how they are impacted by industry standard accreditations. The motive being, that there is a very important connection between industry standard accreditation, industry development and industry performance.

The main objective of many software organizations to achieve industry accreditations is to establish global recognition, so that software organizations could claim that their business standings in par with that of international software developers in terms of technology process and practices. Due to the importance given by the software industry organization for the need to prescribe to industry standard accreditations, it is important to see how that kind of accreditation impacts the organization performance. Another objective is an organization could be to explore the possibility of accreditations.

The first objective of a performance conscious software organization is to recognize the suitable accreditations and find out the suitable models of evaluating them. The second objective is to find out how they could improve themselves using the new accreditations.

The hypothesis of this thesis covers the relationship between software industry standard accreditations and important issues such as financial performance, employee work satisfaction and company business process improvement. The research findings show that there is a strong positive correlation among these combinations.

Another interesting research results of this study show that more than 65% of software companies have their own internal standards and the highest focus area is for obtaining accredited standards for the software development process followed by document handling. Also the research reveals the most important factor sited by the industry for engaging in standard accreditations is for improving product quality followed by improvements to productivity.

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

ACKNOWLEDGMENTS

This dissertation would not have been possible without the guidance and the help of several individuals and other groups, who have contributed their valuable assistance in the preparation of the final result.

I am first heartily thankful to my supervisor Dr. Chandana Gamage and other lectures for their discipline guidance and supervision from the initial level to the final level.

And then my previous working place (MAS Holdings Pvt. Ltd.) and present working place (Naturub Group of Companies) administrative members for their kind consideration and concern regarding my academic requirements.

Last but not least, I must thank my family and my beloved wife Kasundi Samarasinghe for giving me the strength and for their understanding throughout the research.

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

H. W. H. Malaka

MBA in IT 2009/2010

05/01/2011

TABLE OF CONTENTS

DECLARATION ..... **I**
ABSTRACT ..... **III**
ACKNOWLEDGMENTS ..... **IV**
TABLE OF CONTENTS ..... **V**
LIST OF TABLES ..... **IX**
LIST OF ABBREVIATIONS ..... **XI**
1. INTRODUCTION **1**
1.1. Chapter Overview 1
1.2. Background 1
1.3. Research Focus 2
1.4. Research Objectives 4
1.5. Motivation 5
1.6. Chapter Summary 8
2. LITERATURE REVIEW **9**
2.1. Chapter Overview 9
2.2. What are Industry Standards? 9
2.3. Kinds of Standards Applicable for the Study 12
2.3.1. Software Quality Management Standards 12
2.3.2. Software Configuration Management Standards 13
2.3.3. Software Development Process Standards 14
2.3.4. Software Risk Management Standards 15
2.3.5. Software Document Management Standards 16
2.4. Justification and Selected Areas of Standards for the Study 17
2.4.1. Capability Maturity Model Implementation (CMMI) 18
2.4.2. Quality Management Standards by International Standardization for Organizations (ISO 9001) 20
2.4.3. Institute of Electrical and Electronics Engineers (IEEE 829) 22
2.4.4. Software Engineering Institute (SEI) Standards 24
2.5. Benefits of Software Industry Standards 25
2.6. The Value of Continuous Standards Auditing 26
2.7. Limitations and Challenges of Applying and Possessing Standards 28
2.8. What are Organization Performance Indicators? 31
2.9. Software Industry Performance Indicators 33

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

2.10.Factors Influencing Software Industry Performance Indicators and Standard Implementation 36
2.11.Summary 40
3. RESEARCH DESIGN AND METHODOLOGY 41
3.1. Chapter Overview 41
3.2. Research Design 41
3.3. Conceptual Methodology 42
3.4. Analytical Model 45
3.5. Hypothesis Building 46
3.5.1. Industry Standard Accreditation 47
3.5.2. Financial Performance 52
3.5.3. Employee Work Satisfaction 54
3.5.4. Business Process Improvement 56
3.5.5. Size of the Software Organization 60
3.6. Intervening Variables 64
3.6.1. Internal Company Standards (Informal) 64
3.6.2. Type of the Customer Base 65
3.6.3. World Economic Conditions 66
3.6.4. Size of the Company 67
3.7. Summary 67
4. DATA COLLECTION AND ANALYSIS 68
4.1. Chapter Overview 68
4.2. Overview of the Data Sample 68
4.2.1. Justification of the Selected Dataset 70
4.2.2. The Questionnaire 70
4.2.3. The Interviews 73
4.2.4. Observations 74
4.3. Measurements 74
4.4. Reliability Analysis 77
4.4.1. Validity of Industry Standard Accreditation Question Set 79
4.4.2. Validity of Financial Performance Question Set 80
4.4.3. Validity of Employee Work Satisfaction Question Set 81
4.4.4. Validity of Business Process Improvement Question 81

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

4.4.5. Validity of Size of the Company Question Set 82
4.5. Descriptive Analysis 83
4.5.1. Analysing the Age Distribution 84
4.5.2. Gender Distribution 84
4.5.3. Professions of the Sample 85
4.5.4. Organizational Scale 86
4.5.5. Educational Qualifications 86
4.5.6. Customer Base 87
4.5.7. Organizational Own Standards 87
4.5.8. Industry Standard Process Areas 88
4.5.9. Factors Influenced Most Due to Standards 89
4.5.10. Project Scale and Application of Standards 90
4.5.11. Types of Industry Standards 91
4.5.12. Auditing the Standards 92
4.6. Inference Analysis 92
4.6.1. Analysing the Impact on Organizational Financial Performance 93
4.6.2. Analysing the Impact on Employee Work Satisfaction 94
4.6.3. Analysing the Impact on Company Business Processes Improvement 95
4.6.4. Analysing the Impact on Financial Performance Due to Combined Effect of Industry Standard Accreditations and the Size of the Company 96
4.7. Summary 100
5. CONCLUSION 101
5.1. Chapter Overview 101
5.2. Resolution 101
5.3. Recommendations for Future Study 103
5.4. Limitations of the Study 104
5.5. Summary 105
REFERENCE LIST 107
APPENDIX A: THE QUESTIONNAIRE 110
APPENDIX B: DATA SHEET 121

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

LIST OF FIGURES

		Page
Figure 1.1	Relationship between Performance and Microsoft Certification	6
Figure 2.1	The Flow of CMMI Maturity Levels	18
Figure 2.2	Continual Improvements of QMS	21
Figure 2.3	Dynamics and Relationships	37
Figure 3.1	Conceptual Methodology	44
Figure 3.2	Theoretical Framework	45
Figure 3.3	Business Process Improvement Hierarchy	57
Figure 4.1	Number of Responses	77
Figure 4.2	Age Distribution	84
Figure 4.3	Gender Distribution	84
Figure 4.4	Type of Profession	85
Figure 4.5	Organization Scale	86
Figure 4.6	Educational Qualifications	86
Figure 4.7	Customer Base	87
Figure 4.8	Internal Standards	87
Figure 4.9	Process Areas	88
Figure 4.10	Factors Influenced Most Due to Standards	89
Figure 4.11	Small Scale Projects	90
Figure 4.12	Medium Scale Projects	90
Figure 4.13	Large Scale Projects	90
Figure 4.14	Industry Standard Types	91
Figure 4.15	Auditing Standards	92
Figure 4.16	Regression - Linear Equation	99

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

LIST OF TABLES

	Page
Table 1.1 Cost of Implementing Standards	7
Table 2.1 CMMI Model Framework	19
Table 2.2 Stages of IEEE 829	23
Table 3.1 Variable and Dimensions	46
Table 3.2 Variables and Dimensions of the First Hypothesis	54
Table 3.3 Variables and Dimensions of the Second Hypothesis	56
Table 3.4 Variables and Dimensions of the Third Hypothesis	60
Table 3.5 Variables and Dimensions of the Fourth Hypothesis	63
Table 4.1 Data Profile Summary	70
Table 4.2 Inference Analysis Questionnaire and Factors	72
Table 4.3 Descriptive Analysis Questionnaire and Factors	73
Table 4.4 Industry standard Accreditation Measurement Factors	75
Table 4.5 Financial Performance Measurement Factors	75
Table 4.6 Employee Work Satisfaction Measurement Factors	76
Table 4.7 Business Process Improvement Measurement Factors	76
Table 4.8 Company Size Measurement Factors	76
Table 4.9 Summary of Responses	78
Table 4.10 Reliability Statistics for ISA	79
Table 4.11 Item-Total Statistics for ISA	79
Table 4.12 Reliability Statistics for Financial Performance	80
Table 4.13 Item-Total Statistics for Financial Performance	80
Table 4.14 Reliability Statistics for Work Satisfaction	81
Table 4.15 Item-Total Statistics for Work Satisfaction	81
Table 4.16 Reliability Statistics for BPI	82
Table 4.17 Item-Total Statistics for BPI	82
Table 4.18 Reliability Statistics for Size of the Company	83
Table 4.19 Item-Total Statistics for Size of the Company	83
Table 4.20 Descriptive Statistics for the First Hypothesis	93

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

Table 4.21 Correlations for the First Hypothesis 93
Table 4.22 Descriptive Statistics for the Second Hypothesis 94
Table 4.23 Correlations for the Second Hypothesis 95
Table 4.24 Descriptive Statistics for the Third Hypothesis 96
Table 4.25 Correlations for the Third Hypothesis 96
Table 4.26 Descriptive Statistics for the Forth Hypothesis 97
Table 4.27 Correlations for the Forth Hypothesis 97
Table 4.28 Model Summary for the Forth Hypothesis 98
Table 4.29 ANOVA model for the Forth Hypothesis 98
Table 4.30 Coefficient model for the Forth Hypothesis 99

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

LIST OF ABBREVIATIONS

Abbreviation	Description
BPI	Business Process Improvement
CEO	Chief Executive Officer
CMMI	Capability Maturity Model Integration
ERP	Enterprise Resource Planning
EWS	Employee Work Satisfaction
FINP	Financial Performance
GUI	Graphical User Interface
ICTA	Information and Communication Technology Agency
IEEE	Institute of Electrical and Electronics Engineers
ISA	Industry Standard Accreditations
ISO	International Organization for Standardization
IT	Information Technology
R&D	Research and Development
ROI	Return on Investment
QA	Quality Assurance
SCM	Software Configuration Management
SEI	Software Engineering Institute

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