

A FRAMEWORK ON SUCCESSFUL FACTORS FOR  
E-GOVERNMENT SECURITY

UNIVERSITI SAINS ISLAM MALAYSIA  
جامعة العلوم الإسلامية  
ISLAMIC SCIENCE UNIVERSITY OF MALAYSIA

FABIA IHMOUDA HASSANIN

UNIVERSITI SAINS ISLAM MALAYSIA

A FRAMEWORK ON SUCCESSFUL FACTORS FOR  
E-GOVERNMENT SECURITY

Rabia Ihmouda Hassan Masoud

(Matric No. 4120054)

Thesis submitted in fulfillment for the degree of

DOCTOR OF PHILOSOPHY

SCIENCE AND TECHNOLOGY

UNIVERSITI SAINS ISLAM MALAYSIA

November 2017

## AUTHOR DECLARATION

The work presented in this thesis has not been previously submitted to meet requirements for an award at this or any other higher education institution for any degree. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where the due reference is made.

Date: 22 November 2017

Signature:

Name: Rabia Ihmouda Hassan Masoud

Matric No: 4120054

Address: A-12-07 Tiara Faber Condo-Taman Desha-KL

UNIVERSITI SAINS ISLAM MALAYSIA  
جامعة العلوم الإسلامية  
ISLAMIC SCIENCE UNIVERSITY OF MALAYSIA

## BIODATA OF AUTHOR

Rabia Ihmouda Hassan Masoud (4120054) was born on the 10<sup>th</sup> May 1978. He is currently residing at A-12-07 Tiara Faber condo- Taman Desa – KL 58100. He is Libyan, Passport No 708217. He previously was a student of Sebha University and obtained Bachelor of computer science from faculty of science. He obtained Master of IT from UUM. He is at present a PhD student of USIM in Faculty of Science and Technology.

UNIVERSITI SAINS ISLAM MALAYSIA  
جامعة العلوم الإسلامية  
ISLAMIC SCIENCE UNIVERSITY OF MALAYSIA

## ACKNOWLEDGEMENTS

Praise and thanks be to Allah for sustaining and helping me throughout this endeavor. I would like to express my gratitude to the following people for their role in the completion of this thesis:

I would like to express my deepest appreciation to my principal supervisor Dr. Najwa Hayaati Binti Mohd Alwi, for her support, guidance and encouragement over the past few years. She has been very enthusiastic, energetic and consistent in providing me with guidance, encouragement, and unlimited mentoring support. I have been very fortunate to have her as my supervisor. I also would like to thank my Co-Supervisor Prof. Madya Dr. Haji Ismail Abdullah for his support and recommendations, which improved this thesis.

I would also like to thank Dr. Nurdiana Binti Azizan (FST), Prof. Madya Dr. Madihah Binti Mohd Saudi (FST) and Prof. Dr. Rosalina Binti Abdul Salam (FST) for providing invaluable comments and suggestions during the early stages of my study. I also would like to thank Professor Abdul Majid Hussain Mohamed (Sebha University) for his invaluable knowledge and suggestions during the various stages of my study. I also wish to thank my Ph.D. colleagues for giving me a memorable and enjoyable experience. Additionally, I would like to thank Vice Chancellor Prof. Dato' Dr. Musa Bin Ahmad for his encouragement and support to the students. Many thanks are also due to all the individuals and their respective organization who willingly participated in the questionnaire surveys.

Last but not least, I wish to thank to my father and mother for their continual support and prayers. My father, the most gentle and kind person I knew, always encouraged me on every step of my life. He would have been so happy to see me complete my research. However, he left this world last year and left my family and me forever incomplete. I take this opportunity to express my deepest gratitude and eternal prayers for his soul. My deepest gratitude is also to my ever encouraging and emotionally supportive mother. I also extend special thanks to my wife for her patience, care, support and continual encouragement, which has enabled me to complete this thesis. Her sacrifices have not gone unnoticed. I am grateful to my brothers, sisters, relatives and friends who have always encouraged me during this time. My last words are for my children, who have brightened my life.

## PUBLICATION

1. PENETRATION TESTING FOR LIBYAN GOVERNMENT WEBSITE  
*4th International Conference on Computing and Informatics, ICOCI-2013*
2. A SYSTEMATIC REVIEW ON E-GOVERNMENT SECURITY ASPECTS.  
*International Journal of Enhanced Research in Management & Computer Applications, ISSN: 2319-7471. Vol. 3 Issue 6, June-2014, pp: (60-67), Impact Factor: 1.147.*
3. E-GOVERNMENT DEVELOPMENT MODELS: REVIEW OF SOCIAL-TECHNICAL SECURITY ASPECT  
*International conference on Intelligent Systems, Data Mining and Information Technology (ICIDIT'2014), April 21-22, 2014 Bangkok (Thailand)*
4. A COMPARATIVE ANALYSIS OF E-GOVERNMENT SECURITY FRAMEWORKS SOCIAL-TECHNICAL SECURITY ASPECT.  
*International Journal of Management & Information Technology, ISSN: 2278-5612. Vol.9 issue 3, 2014, pp: (1736-1747)*
5. E-GOVERNMENT SECURITY FRAMEWORKS: REVIEW OF SOCIAL-TECHNICAL SECURITY ASPECT  
*USIM POSTGRADUATE COLLOQUIUM (PCFST 2014) 21 October 2014*
6. ASSESSING THE VULNERABILITY OF E-LEARNING PORTALS  
*USIM POSTGRADUATE COLLOQUIUM 10 June 2015*
7. SUCCESSFUL FACTORS ON E-GOVERNMENT SECURITY SOCIAL-TECHNICAL ASPECT  
*ARPN Journal of Engineering and Applied Sciences. VOL. 10, NO 20, NOVEMBER, 2015 ISSN 1819-6608*

## ABSTRAK

Potensi Teknologi Maklumat telah disedari oleh negara membangun dengan mentransformasikan e-kerajaan. Namun projek e-kerajaan yang berjaya memerlukan pelaburan yang secukupnya dalam pengurusan keselamatan maklumat. Walaupun pengurusan keselamatan maklumat bergantung pada aspek teknikal dan sosio-teknikal, sorotan literatur melihatkan kurangnya penyelidikan ilmiah dan professional terhadap budaya keselamatan maklumat di negara membangun. Oleh itu kajian ini bertujuan mengisi jurang literatur dengan mewujudkan satu kerangkakerja budaya keselamatan untuk e-kerajaan di negara membangun. Sehingga kini, pendekatan berasaskan penyelidikan deduktif telah digunakan yang merangkumi sorotan literatur, memilih kerangkakerja bersifat teori yang relevan, merumus hipotesis serta membuat kesimpulan logik dari hasil kajian. Kaedah kuantitatif telah dieksploitasi untuk memeriksa pengaruh fakta-fakta sosio-technical terhadap keselamatan maklumat sambil mengesahkan kerangkakerja. Kesahihan dan kebolehpercayaan kerangkakerja ditunjukkan melalui Analisis *Exploratory Factor* diikuti dengan Analisis *Confirmatory Factor* dari 312 respons kajiselidik yang dilaksanakan di Jabatan Perkhidmatan Awam Malaysia. Permodelan *Structural Equation* juga digunakan untuk menunjukkan kesahihan kerangkakerja. Penyelidikan ini meluaskan pengetahuan empirikal dan teori tentang keselamatan maklumat dan bidang e-kerajaan dengan tumpuan analitis terhadap persilangan kedua-dua bidang. Ia memberi wawasan bagaimana keselamatan maklumat patut dilaksanakan secara berkesan dengan menggunakan pendekatan sosio-teknikal. Ia menguji faktor-faktor sosio-teknikal untuk mengenalpasti bagaimana ia mampu mempengaruhi keselamatan maklumat. Kajian ini menunjukkan bahawa budaya keselamatan sangat penting diwujudkan untuk menambahbaik keberkesanan keselamatan maklumat organisasi. Kerangkakerja yang dicadangkan boleh digunakan sebagai panduan kepada pengamal e-kerajaan dalam menjaga keselamatan maklumat dan memberi fokus dari sudut yang berbeza iaitu sudut perspektif sosio-teknikal. Ia juga menyatakan manfaat untuk mengklasifikasikan kawalan dan penyelesaian yang bersesuaian untuk meningkatkan kesedaran pekerja terhadap keselamatan maklumat.

## ABSTRACT

Significant potentials of information technology have been realized by developing countries by investing in e-government reforms. However, successful e-government project requires substantial investment in information security management. Though effective information security management depends upon technical and socio-technical aspects, review of literature reveals the lack of academic and professional research into information security culture from these perspectives in developing countries. Therefore, this study aimed to fill this gap in literature as well as in developing a security culture framework for e-government in developing countries. To this end, deductive based research approach was used which included reviewing related literature, selecting appropriate theoretical framework, formulating hypotheses and making logical deductions from the results of the study. Quantitative method was exploited to examine the socio-technical factors' influence on information security as well as to validate the framework. The validity and reliability of the framework is demonstrated using data collected from Public Service Department of Malaysia from 312 valid responses through Exploratory Factor Analysis followed by Confirmatory Factor Analysis. In addition, Structural Equation Modeling was also used to demonstrate the validity of the framework. This research contributes to extending the existing empirical and theoretical knowledge of information security and e-government fields by analytically focusing on the intersection of both fields. It provides insights to how information security should be done in an effective manner using a socio-technical approach. It examined socio-technical factors to determine how it affects information security. This study indicates that creating security cultural is significant to improve the effectiveness of information security. The proposed framework can be used as a guide to direct e-government practitioners to focus on information security from different angle – socio-technical perspectives. It would be beneficial to the e-government practitioners to classify the suitable controls and solution to increase the awareness of their employees towards security.

## المخلص

قد حققت البلدان النامية إمكانيات كبيرة لتكنولوجيا المعلومات عن طريق الاستثمار في مجال الحكومة الإلكترونية. ومع ذلك، يتطلب مشروع الحكومة الإلكترونية الناجح استثمارا كبيرا في إدارة أمن المعلومات. وعلى الرغم من أن الإدارة الفعالة لأمن المعلومات تعتمد على الجوانب التقنية والاجتماعية، فإن استعراض الدراسات السابقة يكشف النقص في البحوث الأكاديمية والمهنية في ثقافة أمن المعلومات في البلدان النامية. لذلك، هدفت هذه الدراسة إلى سد هذه الفجوة في الدراسات السابقة وكذلك في وضع إطار ثقافة الأمن للحكومة الإلكترونية في البلدان النامية. ولتحقيق هذه الغاية، تم استخدام منهج البحث الاستدلالي الذي شمل مراجعة الدراسات ذات الصلة، واختيار الإطار النظري المناسب، وصياغة الفرضيات وإجراء استنتاجات منطقية من نتائج الدراسة. واستخدمت الطريقة الكمية لدراسة تأثير العوامل الاجتماعية التقنية على أمن المعلومات وكذلك للتحقق من صحة الإطار. وتظهر صحة وموثوقية الإطار باستخدام البيانات التي تم جمعها من دائرة الخدمة العامة في ماليزيا من 312 عينة صالحة من خلال التحليل العملي الاستكشافي يليها التحليل العملي التوكيدي. وبالإضافة إلى ذلك، استخدمت نمذجة المعادلات الهيكلية أيضا لإثبات صحة الإطار. ويسهم هذا البحث في توسيع نطاق المعرفة العملية والنظرية الحالية لأمن المعلومات ومجال الحكومة الإلكترونية من خلال التركيز على تقاطع كلا المجالين. وهو يوفر رؤية لأمن المعلومات وكيف ينبغي أن تتم بطريقة فعالة باستخدام نهج اجتماعي وتقني. حيث تم اختبار العوامل الاجتماعية التقنية لتحديد كيفية تأثيرها على أمن المعلومات. وتشير هذه الدراسة إلى أن خلق ثقافة الأمن مهم لتحسين فعالية أمن المعلومات. ويمكن استخدام الإطار المقترح كدليل لتوجيه الممارسين في مجال الحكومة الإلكترونية للتركيز على أمن المعلومات من منظور اجتماعي تقني مختلف. وسيكون من المفيد للممارسين في مجال الحكومة الإلكترونية أن يصنفوا الضوابط والحلول المناسبة لزيادة وعي موظفيهم تجاه الأمن.

## TABLE OF CONTENTS

AUTHOR DECLARATION	i
BIODATA OF AUTHOR	ii
ACKNOWLEDGEMENTS	iii
LIST OF PUBLICATIONS	iv
ABSTRAK	v
ABSTRACT	vi
AL-MULAKHKHAS	vii
TABLE OF CONTENTS.....	viii
LIST OF TABLES .....	xii
LIST OF FIGURES .....	xiii
LIST OF APPENDICES .....	xiv
LIST OF ABBREVIATION .....	xv
CHAPTER 1: INTRODUCTION .....	1
1.1 Research Background .....	1
1.2 Research Motivation And Problem Area .....	5
1.3 Research Aims .....	7
1.4 Research Questions .....	7
1.5 Research Objectives .....	7
1.6 Scope Of The Research .....	8
1.7 Research Methodology .....	8
1.8 Research Contribution .....	10
1.8.1 Information Security Community .....	10
1.8.2 E-Government Community .....	11
1.8.3 Other E-Services Community .....	11
1.9 Thesis Structure .....	11
CHAPTER 2: LITERATURE REVIEW .....	13
2.1 E-Government Concepts .....	13
2.1.1 E-Government- Definitions And Perspectives .....	13
2.1.2 E-Government Domains .....	14
2.1.3 E-Government In Developing Countries .....	14
2.1.4 E-Government In Malaysia .....	16
2.1.4.1 Public Service Department Malaysia (JPA) .....	16
2.1.5 E-Government Development Models .....	17
2.1.6 E-Government Security Frameworks .....	18
2.2 Information Security- Overview And Concept .....	20
2.2.1 Security Standards .....	21
2.2.1.1 ISO Standards .....	21
2.2.1.2 COBIT Standard .....	21
2.2.1.3 ITIL Standard .....	22
2.3 The Socio-Technical Approach .....	22

2.3.1 Socio-Technical Model (STM) .....	22
2.3.2 Security By Consensus (SBC) Model .....	23
2.4 Information Security Culture .....	24
2.5 Information System Security Effectiveness.....	26
2.5.1 Information Security Effectiveness Models And Frameworks .....	26
2.6 Socio-Technical Factors .....	28
2.6.1 Successful Socio-Technical Factors .....	30
2.6.1.1 Legal & Law .....	34
2.6.1.2 Compliance .....	34
2.6.1.3 Ethical Conduct .....	35
2.6.1.4 Information Security Policy .....	36
2.6.1.5 Security Awareness .....	36
2.6.1.6 Information Security Training .....	37
2.6.1.7 Top Management Support .....	38
2.6.1.8 Security Culture .....	39
2.6.1.9 Information Security Structure .....	39
2.7 Research Gaps .....	40
2.8 Chapter Summary .....	42
<b>CHAPTER 3: RESEARCH METHODOLOGY .....</b>	<b>43</b>
3.1 Conceptual Framework Development.....	43
3.2 Research Design .....	44
3.2.1 Research Philosophy .....	45
3.2.2 Research Approach .....	46
3.3.3 Research Method .....	46
3.3.3.1 Qualitative Method .....	46
3.3.3.2 Quantitative Method .....	47
3.3.3.3 Mixed Research Method .....	47
3.3.4 Research strategy .....	49
3.3.4.1 Soft Systems Methodology .....	49
3.4 Methodology Related To Information Security Management .....	50
3.5 Data Collection And Analysis .....	49
3.5.1 Data Collection .....	52
3.5.1.1 Questionnaire Development .....	53
3.5.1.2 Questionnaire Distribution .....	54
3.5.2 Data Analysis Techniques/Tool/Process .....	55
3.5.2.1 Reliability .....	57
3.5.2.2 Validity .....	57
3.5.3 Pilot Test .....	59
3.6 Chapter Summary .....	63
<b>CHAPTER 4: DATA ANALYSIS AND RESULTS .....</b>	<b>64</b>
4.1 Questionnaire Survey And Respondent Profiles .....	65
4.1.1 Questionnaire Survey .....	65
4.1.2 Respondent Profiles .....	66
4.2 Data Screening .....	67

4.2.1 Missing Data Analysis .....	68
4.2.2 Assessment Of Normality .....	68
4.2.3 Assessment Of Standard Deviations And Standard Errors Of The Mean .....	70
4.2.4 Preliminary Findings .....	71
4.3 Scale Reliability .....	72
4.3.1 Internal Consistency .....	72
4.3.2 Item-Total Correlations .....	73
4.4 Exploratory Factor Analysis .....	75
4.4.1 Factorability Of Data .....	75
4.4.2 Factor Extraction And Rotation .....	76
4.4.3 Exploratory Factor Analysis Results .....	78
4.5 Confirmatory Factor Analyses .....	80
4.5.1 Assessment Of Model Fit And Estimation Methods .....	81
4.5.2 Assessment Of Construct Validity .....	83
4.5.3 Confirmatory Factor Analysis Results .....	83
4.6 Chapter Summary .....	87
CHAPTER5: FRAMEWORK DEVELOPMENT .....	89
5.1 Socio-Technical Factors .....	89
5.2 The Framework Development .....	92
5.3 Chapter Summary .....	95
CHAPTER 6: FRAMEWORK VALIDATION .....	96
6.1 SEM Overview .....	96
6.2 Measurement Framework Assessment .....	97
6.2.1 Measurement Framework Specification and Assessment Criteria .....	97
6.2.2 Measurement Framework Results .....	99
6.3 Testing The Nomological Validity Of Socio-Technical Security Measurement Framework .....	103
6.3.1 Mediation Test .....	105
6.3.2 Mediation Test Result .....	106
6.3.3 Confirming the Mediation Test Result through Bootstrapping .....	112
6.4 Expert Review .....	115
6.4.1 The Expert Background.....	115
6.4.2 Findings of Expert Review Session.....	115
6.4 Chapter Summary .....	116
CHAPTER 7: DISCUSSION .....	117
7.1 Achievement of Research Aim and Objectives .....	117
7.2 Discussion of Results of Objectives .....	128
7.3 Chapter Summary .....	129
CHAPTER 8: CONCLUSION .....	130
8.1 Overview .....	130
8.2 Research Outcome Contributions .....	133
8.2.1 Theoretical Contribution.....	133

8.2.1.1 Framework.....	133
8.2.1.2 Methodology.....	134
8.2.2 Industry Contribution.....	134
8.2.2.1 Information Security Community .....	134
8.2.2.2 E-Government Community .....	135
8.2.2.3 Other E-Services Community .....	135
8.3 Implications .....	136
8.3.1 Implications For Research .....	137
8.3.2 Implications For Practice .....	138
8.4 Limitations .....	139
8.5 Future Research .....	139
8.6 Conclusion .....	140
Bibliography .....	142
Appendix A Consent Form .....	169
Appendix B Questionnaire .....	171
Appendix C Expert Review Questionnaire.....	175

UNIVERSITI SAINS ISLAM MALAYSIA  
جامعة العلوم الإسلامية  
ISLAMIC SCIENCE UNIVERSITY OF MALAYSIA

## LIST OF TABLES

<b>Tables</b>	<b>Page</b>
Table 2.1: Some E-Government Definitions .....	14
Table 2.2: E-Government Development Models Concept. ....	18
Table 2.3: Socio-Technical Factors Influencing Information Security.....	30
Table 2.4: Successful Socio-Technical Factors.....	34
Table 3.1: Research Hypothesis To Be Tested In A Subsequent Survey Phase.....	44
Table 3.2: Differences Between Quantitative And Qualitative Research .....	48
Table 3.3: Soft Systems Methodology (SSM) Steps .....	49
Table 3.4: Cronbach's Alpha For Each Field Of The Instrument .....	60
Table 3.5: Factor Loading For Each Item Of The Instrument .....	61
Table 3.6: The Discriminant Validity Index Summary .....	62
Table 4.1: Frequencies Of Demographic Variable .....	66
Table 4.2: Assessment Of Normality .....	69
Table 4.3: Descriptive Statistics .....	71
Table 4.4: Cronbach's Alphas Of Measurement Scales For Each Construct .....	73
Table 4.5: Item-Total Correlations Of Each Construct .....	74
Table 4.6: KMO And Bartlett's Test Of Sphericity .....	76
Table 4.7: Rotated Factor Loadings Of The Research Framework Constructs .....	79
Table 4.8: The Factor Loading And R2 Result .....	84
Table 4.9: The Discriminant Validity Index Summary .....	85
Table 4.10 Confirmatory Factor Results Summaries .....	86
Table 6.1: Factor Correlation Between Research Framework Constructs .....	100
Table 6.2: Discriminant Validity .....	101
Table 6.3: The CFA Report For R2, CR And AVE .....	101
Table 6.4: The Standardized Regression Weights And its Significance For Each Path.....	107
Table 6.5: The Results Of Hypothesis Test .....	112
Table 6.6: Bootstrapping Result (Standardized Indirect Effects) .....	112
Table 6.7: The P-Value (Indirect Effects) .....	113
Table 6.8 Bootstrapping Result (Standardized Direct Effects) .....	113
Table 6.9 The P-Value (Direct Effects) .....	113
Table 6.10: Bootstrapping Results Summarize .....	113

## LIST OF FIGURES

Figures	Page
Figure 1.1: The Research Methodology .....	9
Figure 2.1: Socio-Technical Model .....	23
Figure 2.2: The Basic SBC Model .....	23
Figure 2.3: Mapping the Desired ICT Security Management State (ISO 17799) Onto The SBC Model .....	24
Figure 2.4: Model of IS Security Effectiveness .....	27
Figure 3.1: The Conceptual Framework .....	44
Figure 4.1: Data Preparation Process Criteria .....	64
Figure 4.2: Data Analysis Process .....	65
Figure 4.3: Scree Plot .....	80
Figure 4.4: CFA Framework For Socio-Technical Factors That Influence The Security.....	86
Figure 5.1: Information Security Culture Framework For Securing E-Government	95
Figure 6.1: CFA Framework .....	102
Figure 6.2: Mediation Test Procedure .....	105
Figure 6.3: The Standardized Regression Weights For Every Path In The Framework .....	106
Figure 6.4: The Mediation Test of Training On Security Effectiveness .....	107
Figure 6.5: The Mediation Test of Security Policy On Security Effectiveness.....	108
Figure 6.6: Mediation Test of IS Structure On Security Effectiveness.....	108
Figure 6.7: Mediation Test of Security Awareness On Security Effectiveness.....	109
Figure 6.8: Mediation Test of Ethical Conduct On Security Effectiveness.....	109
Figure 6.9: Mediation Test of Legal On Security Effectiveness.....	110
Figure 6.10: Mediation Test of Compliance On Security Effectiveness.....	110
Figure 6.11: Mediation Test of Top Management Support On Security Effectiveness.....	111

## LIST OF APPENDICES

Appendices	Page
Appendix A Consent Form .....	169
Appendix B Questionnaire .....	171
Appendix C Expert Review Questionnaire.....	176

UNIVERSITI SAINS ISLAM MALAYSIA  
جامعة العلوم الإسلامية  
ISLAMIC SCIENCE UNIVERSITY OF MALAYSIA

## LIST OF ABBREVIATIONS

ADF	Asymptotically Distribution Free
AGFI	Adjusted-Goodness-Of-Fit-Index
AMOS	Analysis Of Moment Structure
AVE	Average Variance Explain
AW	Security Awareness
CFA	Confirmatory Factor Analysis
CFI	Comparative-Fit Index
COBIT	The Control Objectives For Information And Related Technology
<i>df</i>	Degree Of Freedom
DSR	Design Science Research
EC	Ethical Conduct
eGDMs	E-Government Development Models
EF	Security Effectiveness
EFA	Exploratory Factor Analysis
GDT	General Deterrence Theory
GFI	Goodness-Of-Fit Index
GLS	Generalized Least Square
HIPAA	Health Insurance Portability And Accountability Act
IC	Compliance
ICT	Information Communication Technology
IDV	Individualism Index
IFI	Incremental-Fit Index
IP	Information Security Policy
ISO	International Organization For Standardization
IS	Information System
ISMS	Information Security Management System
IT	Information Technology
ITIL	Information Technology Infrastructure Library
IVR	Indulgence Vs. Restraint Index
KMO	Kaiser-Meyer-Olkin Measure Of Sampling Adequacy
L	Legal & Law
LTO	Term Orientation Index
MAS	Masculinity Index
ML	Maximum Likelihood
NFI	Normed-Fit Index
OLS	Ordinary Least Square
PCA	Principal Component Analysis
PDI	Power Distance Index
RMR	Root Mean Square Residual
RMSEA	Root Mean Square Error Of Approximation
JPA	Public Service Department Malaysia
RQ	Research Question
SD	Standard Deviation

SE	Standard Error
SEM	Structural Equation Modeling
SRMR	Standardized Root Mean Square Residual
STM	Socio-Technical Model
SBC	Security-By-Consensus
SC	Security Culture
SOA	Service-Oriented Architecture
SPSS	Statistical Package For The Social Sciences
SSM	Soft Systems Methodology
T	Information Security Training
TLI	Tucker-Lewis Index
TM	Top Management Support
WLS	Weighted Least Square
X <sup>2</sup>	Chi-Square

UNIVERSITI SAINS ISLAM MALAYSIA  
 جامعة العلوم الإسلامية  
 ISLAMIC SCIENCE UNIVERSITY OF MALAYSIA