

**GREEN IT PRACTICE: MODEL FOR
ORGANISATIONAL SUSTAINABILITY IN MALAYSIA**

BY

SRI FATIANY ABDUL KADER JAILANI

A thesis submitted in fulfillment of the requirement for the
degree of Doctor of Philosophy in Information Technology

**Kuliyah of Information and Communication Technology
International Islamic University Malaysia**

APRIL 2020

ABSTRACT

Organisational sustainability are viewed from the economic, social, and environmental perspectives. Focusing on organisational sustainability has allowed organisations to accomplish their goal. Green IT practice plays an important role in organisational management. However, at present, Green IT practice and its influence remain equivocal in the field of ICT and sustainability. Regardless, there are voluminous research efforts on the topic in an attempt to minimise compromising the well-being of future generations. In Malaysia, Green IT has been introduced since 2009. Nevertheless, Green IT acceptance among Malaysians is progressing rather slowly and this is alarming. Even though empirical discussions related to Green IT practice are abundant as it is studied around the globe, only limited number of studies have been conducted to investigate the current practice and they hardly focus upon Malaysia specifically. In the absence of previous research on Green IT in Malaysia, the direction and orientation of this study has been significantly influenced by four decades of Green IT research in Western nations. Thus, this study was carried out to identify Green IT practice in organisations in Malaysia and to examine the influence of Green IT practice on organisational sustainability. A new model on Green IT practice for organisational sustainability was proposed. In formulating this model, a sequential exploratory research design was used to explore the influences between variables. The data collection was carried out for a period of two months. In the exploratory study phase, interviews with ten IT executives were conducted to identify Green IT practices in the organisations. 35 Green IT practices were identified in the sample organisations. Meanwhile, on quantitative phase involved the administration of a questionnaire that measured the respondents' demographic, Green IT knowledge, Green IT belief, institutional pressure, Green IT practice and organisational sustainability. Simple random sampling was used and 323 usable data were gathered from IT executives. Data were analysed using SPSS Statistics version 23.0 and Analysis of Moment Structures - Structural Equation Modelling (AMOS-SEM). The result showed direct influence between Green IT practice and organisational sustainability. On the contrary, insignificant results were found in the influence between Green IT knowledge with Green IT practice, and Green IT belief with Green IT practice. The findings of this study revealed the current implementation of Green IT in Malaysia. From a practical viewpoint, this study will be useful for related government agency to measure the level of Green IT practice in Malaysia. Moreover, it will assist organisations in their strategic planning to fully maximise the advantage of Green IT practice.

خلاصة البحث

للإستدامة المؤسسية أبعاد اقتصادية واجتماعية وبيئية هامة، نظراً لما تلعبه من دور في مساعدة المنشآت المؤسسية المتعددة على بلوغ أهدافها وغاياتها المنشودة. وعلى الرغم من أهمية الدور الذي تلعبه ممارسة تكنولوجيا المعلومات الخضراء (الصديقة للبيئة) في الإستدامة المؤسسية، لم يتم تسليط الضوء الكافي على هذا النوع من تكنولوجيا المعلومات، ولا على أثرها العميق في مجال الحاسوب وتقنياته المختلفة حتى وقتنا الحالي. وقد ظهرت العديد من المجهودات البحثية المطولة حول هذا الموضوع، وهي جهود جاءت كمحاولة لخلق مستقبل أفضل للأجيال القادمة. وهنا في ماليزيا، تم طرح فكرة التكنولوجيا الخضراء منذ عام 2009، إلا أن تقبل هذا النوع من التكنولوجيا - من قبل الماليزيين - يسيير بشئ من البطئ، وهو ما قد يثير قلق بعض المهتمين بهذا الموضوع. وعلى الرغم من وجود العديد من الدراسات التجريبية التي تناولت موضوع ممارسة تكنولوجيا المعلومات الخضراء بالبحث و التدقيق، إلا أن القليل منها فقط تطرق إلى دراسة تطبيق تكنولوجيا المعلومات الخضراء الحالية التي يتم استخدامها، ولم تتطرق أي من هذه الدراسات على الإطلاق، لدراسة واقع تطبيق واستخدام هذه الممارسات في الواقع الماليزي. وفي هذا الإطار، ونظراً لعدم وجود أي دراسات سابقة ترصد أو تفنذ واقع ممارسة تكنولوجيا المعلومات الخضراء في ماليزيا، فلقد تأثرت هذه الدراسة بالطبع، قلباً وقالباً، بأربع عقود كاملة من التاريخ البحثي في مجال ممارسة تكنولوجيا المعلومات الخضراء في الدول الغربية. ولقد بنيت هذه الدراسة على أساس تحديد وتعريف مفهوم ممارسة تكنولوجيا المعلومات الخضراء داخل المؤسسات الماليزية من ناحية، ودراسة مدي تأثيرها على الإستدامة المؤسسية من ناحية أخرى. وقد قام الباحث باستخدام أسلوب بحثي استكشافي متسلسل في للبحث في العلاقة بين المتغيرات المختلفة. وقد تم جمع المعلومات الخاصة بهذا البحث على مدار شهرين كاملين. في المرحلة الأولى تم إجراء مقابلات شخصية مع عشرة من مستخدمي تكنولوجيا المعلومات الخضراء، بهدف تحديد أبعاد ممارسة تكنولوجيا المعلومات الخضراء داخل المؤسسات. وفي هذا الإطار، قامت الدراسة برصد خمسة و ثلاثين نوع من هذه الممارسات أو تطبيقات استخدام هذا النوع من التكنولوجيا. وفي المرحلة الثانية، تم تقديم إستجاب لموظفي الإدارة لقياس معلوماتهم السكانية ومدي درايتهم و معرفتهم بتكنولوجيا المعلومات الخضراء ومفاهيمها، وبالإضافة إلى قياس الضغط المؤسسي، وحجم استخدام تكنولوجيا المعلومات الخضراء في الإستدامة المؤسسية. وتم عرض عينة عشوائية بسيطة و تجميع عدد 323 من البيانات القابلة للإستخدام من قبل مستخدمي تكنولوجيا المعلومات. وقد تم تحليل البيانات باستخدام البرامجة التالية:

برنامج (AMOS-SEM) Analysis of Moment Structures - Structural Modelling وبرنامج SPSS Statistics version 23.0 وقد أشارت النتائج إلى وجود علاقة مباشرة بين استخدام ممارسة تطبيق تكنولوجيا المعلومات الخضراء من ناحية والإستدامة المؤسسية من ناحية أخرى. و على العكس من هذا لم ترصد الدراسة وجود أي علاقة تذكر بين وجود خلفية مسبقة بتكنولوجيا المعلومات الخضراء من ناحية وآليات تطبيقها من ناحية أخرى، ولا بين وجود قناعة بأهمية تكنولوجيا المعلومات الخضراء من ناحية و تطبيقها من ناحية أخرى. وقد عكست الدراسة واقع تطبيق تكنولوجيا المعلومات الخضراء في ماليزيا. ومن الناحية التطبيقية، فإن هذه الدراسة تكون ذات نفع كبير للوكالات الحكومية المعنية بقياس مستوى ومقدار تطبيق تكنولوجيا المعلومات الخضراء في ماليزيا، هذا بالطبع بالإضافة إلى الدور المساعد الذي ستلعبه في مساعدة المنظمات المختلفة في وضع خطط استراتيجية لتعميق الإستفادة من مميزات استخدام تكنولوجيا المعلومات الخضراء.

APPROVAL PAGE

The thesis of Sri Fatiany Abdul Kader Jailani has been approved by the following:

Lili Marziana Abdullah
Supervisor

Dr. Mira Kartiwi
Co-Supervisor

Husnayati Hussin
Co-Supervisor

Abdul Rahman Ahlan
Internal Examiner

Wan Fatimah Wan Ahmad
External Examiner

J.A.S.K. Jayakody
External Examiner

Amir Akramin Shafie
Chairman

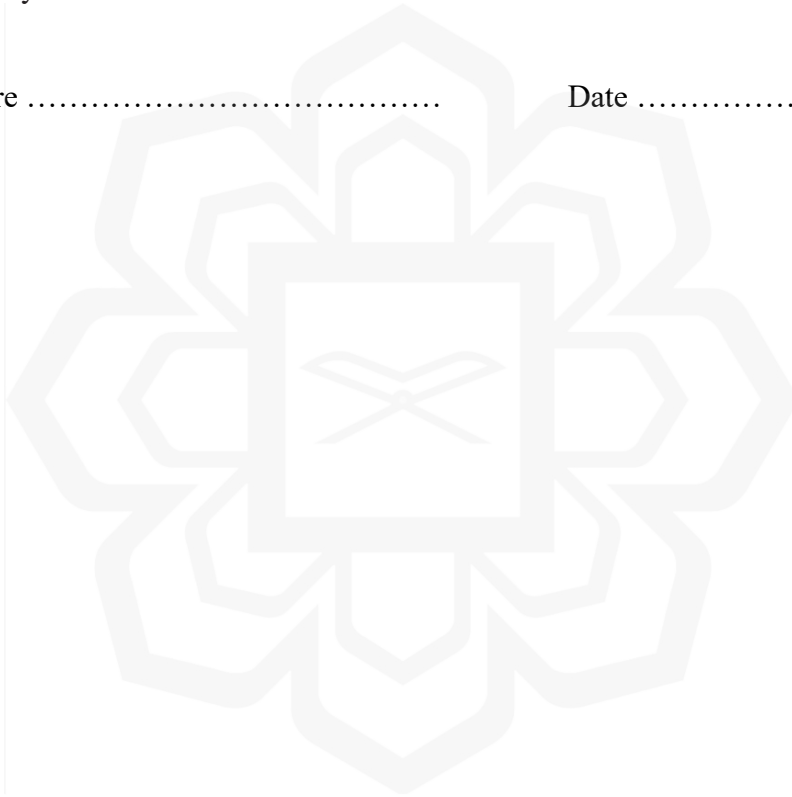
DECLARATION

I hereby declare that this thesis is the result of my own investigations, except where otherwise stated. I also declare that it has not been previously or concurrently submitted as a whole for any other degrees at IIUM or other institutions.

Sri Fatiany Abdul Kader Jailani

Signature

Date



INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

**DECLARATION OF COPYRIGHT AND AFFIRMATION
OF FAIR USE OF UNPUBLISHED RESEARCH**

**GREEN IT PRACTICE: MODEL FOR ORGANISATIONAL
SUSTAINABILITY IN MALAYSIA**

I declare that the copyright holder of this thesis is International Islamic University
Malaysia.

Copyright © 2019 by Sri Fatiany Abdul Kader Jailani. All rights reserved

No part of this unpublished research may be reproduced, stored in a retrieval system,
or transmitted, in any form or by any means, electronic, mechanical, photocopying,
recording or otherwise without prior written permission of the copyright holder
except as provided below

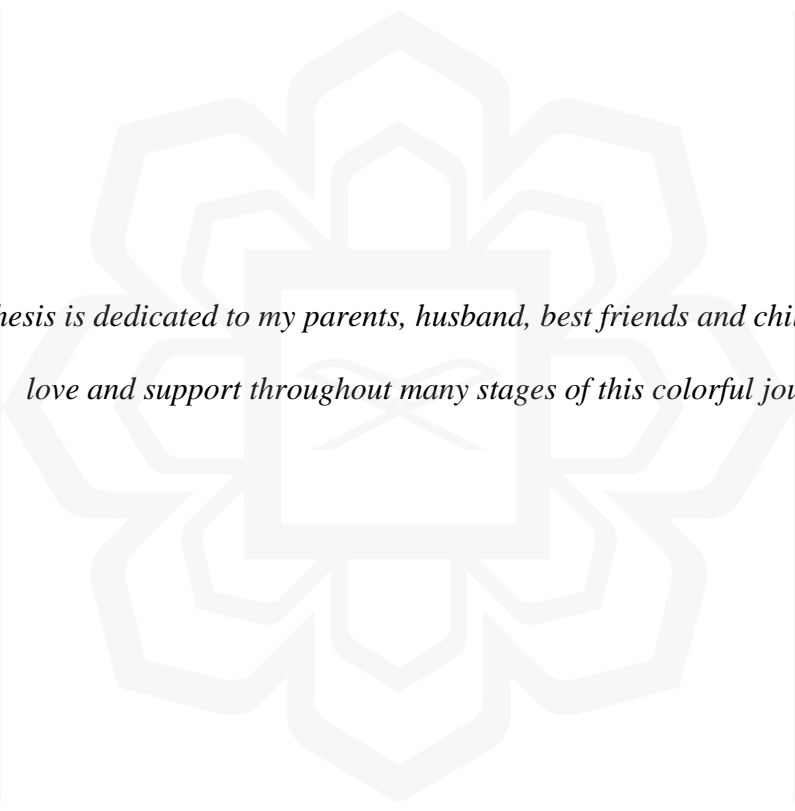
1. Any material contained in or derived from this unpublished research may only
be used by others in their writing with due acknowledgement.
2. IIUM or its library will have the right to make and transmit copies (print or
electronic) for institutional and academic purposes.
3. The IIUM library will have the right to make, store in a retrieval system and
supply copies of this unpublished research if requested by other universities
and research libraries.

By signing this form, I acknowledged that I have read and understand the IIUM
Intellectual Property Right and Commercialization policy.

Affirmed by Sri Fatiany Abdul Kader Jailani

.....
Signature

.....
Date



This thesis is dedicated to my parents, husband, best friends and children for their love and support throughout many stages of this colorful journey.

ACKNOWLEDGEMENT

In the name of Allah, the Most Gracious and the Most Merciful. First and foremost, I am thankful and grateful to the Almighty Allah SWT, the Creator and Sustainer of the universe, the Most Beneficent for the guidance, patience, strength, wisdom, and blessings that He has bestowed upon me in paving my way towards accomplishing this thesis successfully.

The completion of this thesis would not have been possible without the support and encouragement of several special people. Henceforth, I would like to take this opportunity to show my gratitude to those who have assisted me in a myriad of ways. Most importantly, my sincerest appreciation goes to Mama, Papa, Mak and Abah for your blessing, dua' and support. Your prayer for me is what sustained me this far. May Allah place all of you in the highest level of Jannah.

My utmost special appreciation and deepest gratitude go to my supervisor, Dr. Lili Marziana Abdullah and co-supervisors Dr. Mira Kartiwi and Professor Husnayati Hussin who had diligently rendered their continuous support, assistance, patience, motivation, enthusiasm and immense knowledge in the research area. The invaluable and perpetual assistance rendered by them, including constructive comments, conducive guidance and everlasting suggestions and ideas throughout this thesis have contributed constructively to the success of this research. Without them, the completion of this thesis would have been impossible.

A sincerely heartfelt gratitude and thank you to my treasured and beloved husband, Mohammad Fariz Md Noor for standing by me during this toughest 4 years PhD journey. He was with me during day and night accompanying me reading my articles, journals and thesis writing. He has been my pillar of strengths during the time I felt useless, lost of words and feel like throwing out everything. He was the one who always made me feel that PhD is doable, assuring me that I can complete it despite all hurdles and obstacles, and always reminded me not to give up and fall back to the original goal of doing PhD. Your amazing dedication, continuous support, great commitment, and endless immediate assistance is simply incredible. To my beloved and precious children Muhammad Faiq Fasyeen, Nurdayini Leiya Faiqah, Nuraimy Adriana Faiqah and Nurameera Leiana Faiqah, thank you for their endless support, love, prayers, and words of encouragement that has sustained me this far.

A heartfelt thank you to my buddies and best friends, Ain and Syuk for their endless support. Thank you for always believing in me and for always being there for me. Not forgetting my beloved siblings Adeq, Baby, Aden, and Hany for their constant encouragement, which ultimately made it possible for me to achieve this milestone in my life. Not forgetting my colleagues thank you for listening, offering me advice, and supporting me throughout the entire process of completing my PhD journey.

I am also indebted to Professor Ramayah Thurasamy (Universiti Sains Malaysia), Professor Dr. Zainudin Awang (Universiti Sultan Zainal Abidin) and Assoc. Prof. Dr. Mohd Sobhi Ishak (Universiti Utara Malaysia) for sharing their technical know-how on the aspects of methodology and data analysis. My appreciation also goes to the respondents for their willingness to participate in this study. And, to everyone that I have failed to mention here but have rendered their help during this research period, whether directly or indirectly; thank you and I sincerely hope that Allah SWT will bless all of you. Last but not least, this study would not have been materialised without a financial support from the Ministry of Education Malaysia (MOE) and study leave from Universiti Teknologi MARA (UiTM). *Jazakumullahu khairan kathir.*

TABLE OF CONTENTS

Abstract	ii
Abstract in Arabic	iii
Approval Page.....	iv
Declaration	v
Copyrigh	vi
Dedication	vii
Acknowledgement	viii
Table of Contents	ix
List of Tables	xv
List of Figures	xviii
CHAPTER ONE: INTRODUCTION	1
1.1 Overview	1
1.2 Background of the Study	1
1.3 Green IT in Malaysia.....	3
1.4 Sustainability	6
1.5 Problem Statement.....	9
1.6 Research Questions	11
1.7 Research Objectives	13
1.8 Scope of Study.....	13
1.9 Significance of Study	14
1.9.1 Theoretical Contribution	14
1.9.2 Practical Contribution	15
1.10 Operational Definition of Terms	16
1.11 Organisations of the Study	17
1.12 Summary.....	21
CHAPTER TWO: LITERATURE REVIEW.....	23
2.1 Overview	23
2.2 Introduction	23
2.3 SLR Research Questions	26
2.4 Identifying Relevant Literature	27
2.5 Selection of Studies	28

2.5.1	Primary Search	28
2.5.2	Secondary Search	31
2.6	Selection Criteria	31
2.6.1	Inclusion Criteria	33
2.6.2	Preliminary Selection Process (Titles and Abstract)	33
2.6.3	Exclusion Criteria	34
2.6.4	Final Selection Process (Full Text)	34
2.7	Quality Assessment Criteria	34
2.8	Data Extraction	36
2.8.1	Data Extraction Form	36
2.9	Data Synthesis	37
2.9.1	Research Question 1	37
2.9.2	Research Question 2	47
2.9.3	Research Question 3	53
2.9.4	Research Question 4	68
2.10	Review of SLR	81
2.11	Summary	82
CHAPTER THREE: RESEARCH FRAMEWORK.....		83
3.1	Introduction	83
3.2	Past Studies on Green IT Practice	83
3.2.1	Theoretical Perspectives	83
3.2.2	Methodological Approaches	86
3.3	The Determinants of Green IT Practice.....	87
3.3.1	Green IT Knowledge	87
3.3.2	Green IT Belief	88
3.3.3	Institutional Pressure Theory	88
3.3.3.1	Mimetic.....	91
3.3.3.2	Coercive.....	91
3.3.3.3	Normative	91
3.4	Green IT Practice.....	92
3.4.1	Green IT Reuse/Disposal	93
3.4.2	Green Data Center	93
3.4.3	Green Purchase	94
3.4.4	Green Procurement	94
3.4.5	Green Facility	95

3.5	Organisational Sustainability.....	95
3.6	Underpinning Theory	96
3.6.1	Belief Action Outcome Framework (BAO)	96
3.7	Research Framework Hypotheseses Developed.....	98
3.7.1	The Linkage Between Green IT Practice with Organisational Sustainability.....	98
3.7.2	The Linkage Between Green IT Practice with Economic	99
3.7.3	The Linkage Between Green IT Practice with Social	100
3.7.4	The Linkage Between Green IT Practice with Environmental .	101
3.7.5	The Linkage Between Green IT Knowledge and Green IT Practice	102
3.7.6	The Linkage Between Green IT Belief and Green IT Practice .	103
3.7.7	The Linkage Between Institutional Pressure and Green IT Practice	104
3.7.8	The Linkage Between Coercive Pressure and Green IT Practice	105
3.7.9	The Linkage Between Normative Pressure and Green IT Practice	105
3.7.10	The Linkage Between Mimetic Pressure and Green IT Practice	106
3.8	Proposed Research Model	108
3.9	Summary.....	109
CHAPTER FOUR METHODOLOGY.....		110
4.1	Introduction	110
4.2	Research Approach.....	112
4.3	Research Design	114
4.3.1	Sequential Exploratory Research Design.....	116
4.3.2	Research Paradigm.....	117
4.4	Population.....	118
4.5	Sampling Design	120
4.6	Sampling Size	122
4.7	Instruments Development.....	124
4.8	Pre-Test.....	136
4.9	Pilot Study	137
4.10	Data Collection Procedures	139
4.11	Data Analysis Procedure	141
4.11.1	Exploratory Study Phase	141
4.11.1.1	Raw Data Management	142
4.11.1.2	Data Transcripts	142

4.11.2	Quantitative Phase.....	147
4.11.2.1	Data Coding and Treatment of Missing Values	147
4.11.2.2	Outliers Test	148
4.11.2.3	Normality Test	149
4.11.2.4	Multicollinearity Test	154
4.11.2.5	Descriptive Analysis	155
4.11.3	Reliability Analysis	156
4.11.4	Factor Analysis	158
4.11.4.1	Procedure of Exploratory Factor Analysis (EFA).....	159
4.11.4.2	Summary of Exploratory Factor Analysis	175
4.11.4.3	Procedure of Confirmatory Factor Analysis (CFA)	177
4.11.5	Structural Equation Modelling (SEM) and Hypothesis Testing	177
4.11.5.1	Absolute Fit	178
4.11.5.2	Incremental Fit	179
4.11.5.3	Parsimonious Fit	179
4.12	Justification for using Structured Equation Modelling (SEM).....	180
4.13	Summary.....	181
CHAPTER FIVE DATA ANALYSIS AND FINDINGS.....		183
5.1	Introduction	183
5.2	Response Rate	183
5.3	Exploratory Study Phase	184
5.3.1	The Findings	185
5.4	Quantitative Phase.....	189
5.4.1	Respondents' Demographic Profile	189
5.4.2	Green IT Knowledge	193
5.4.3	Green IT Belief	194
5.4.4	Institutional Pressure	195
5.4.5	Green IT Practice	197
5.4.6	Organisational Sustainability	201
5.5	Summary.....	204
CHAPTER SIX MEASUREMENT MODELS.....		206
6.1	Introduction	206
6.2	Confirmatory Factor Analysis (CFA).....	206
6.3	Assessing the Fitness of the Measurement Model	208
6.3.1	CFA of Green IT Knowledge and Green IT Belief	209

6.3.2	Confirmation of Second Order Latent Variables for Institutional Pressure	210
6.3.3	Confirmation of Second Order Latent Variables for Green IT Practice	212
6.3.4	Confirmation of Second Order Latent Variables for Organisational Sustainability	215
6.3.5	The Pooled-CFA to Validate the Measurement Model for All Constructs	218
6.3.6	Summary of Confirmatory Factor Analysis (CFA)	222
6.4	Correlations Among Latent Variables	223
6.5	Analysis of the Baseline Structural Model	225
6.6	Research Model Revisited	228
6.7	Results of Hypothesis Testing	230
6.7.1	Influence between Green IT Practice and Organisational Sustainability	231
6.7.2	Influence between Green IT Knowledge and Green IT Practice	233
6.7.3	Influence between Green IT Belief and Green IT Practice	234
6.7.4	Influence between Institutional Pressure and Green IT Practice	234
6.8	Summary	235
CHAPTER SEVEN DISCUSSIONS AND CONCLUSION		237
7.1	Introduction	237
7.2	Recapitulation of Research Findings	237
7.3	Discussion of Findings	239
7.3.1	Implementation of Green IT Practice in Organisations	239
7.3.2	The Influence of Green IT practice on Organisational Sustainability	244
7.3.2.1	The Influence of Green IT Practice on Social	247
7.3.2.2	The Influence of Green IT Practice on Economic	249
7.3.2.3	The Influence of Green IT Practice on Environment	251
7.3.3	The Influence of Green IT knowledge, Green IT belief and Institutional Pressure on Green IT practice	253
7.3.3.1	The influence of Green IT knowledge and belief on Green IT practice	254
7.3.3.2	The Influence of Institutional Pressure on Green IT practice	256
7.3.3.3	The Influence of Coercive Pressure on Green IT practice	258

7.3.3.4	The Influence of Normative Pressure on Green IT practice	259
7.3.3.5	The Influence of Mimetic Pressure on Green IT practice	260
7.3.4	Components of The New Model of Green IT Practice for Organisational Sustainability	261
7.4	Contributions and Implications of the Study.....	264
7.4.1	Theoretical and Empirical Implications	265
7.4.2	Practical Implications	267
7.5	Study Limitations	268
7.6	Recommendation for Future Research	270
7.7	Conclusion.....	271
7.8	Summary.....	274
REFERENCES.....		275
APPENDIX A:DATA EXTRACTION FORM AND RESULTS		297
APPENDIX B:LIST OF GREEN IT PRACTICES.....		300
APPENDIX C:SEQUENTIAL EXPLORATORY INSTRUMENT		302
APPENDIX D:QUESTIONNAIRE VALIDATION FORM.....		307
APPENDIX E:SUPPORTING LETTER		329
APPENDIX F:CODE BOOK FOR DATA ENTRY AND INTERPRETATION		338
APPENDIX G:ITEMS FACTOR LOADINGS		347
APPENDIX H:LIST OF PUBLICATIONS		347

LIST OF TABLES

<u>Table No.</u>		<u>Page No.</u>
1.1:	Research Questions, Research Objectives, Hypothesis and Methodology	12
1.2:	Organisations of the Thesis	19
2.1:	Research Questions as Structured by the PICOC Criteria	26
2.2:	Major search terms derived from PICOC	27
2.3:	Search Terms Derived from Tables 2.2 along with their Alternate Spellings and Synonyms	28
2.4:	Concatenation of Synonyms and Alternate Spellings Using the Boolean OR Operator	28
2.5:	Construction of the Search String by Concatenating Search Terms Using the Boolean Operator AND	28
2.6:	Procedure for Documenting the Search Process	30
2.7:	Construction of Search String on Google Scholar	31
2.8:	Quality Assessment Checklist for Primary Studies	35
2.9:	Study on Green IT Practice	39
2.10:	Type and Factors of Green IT Practices	65
2.11:	Economic Indicator/Statements	69
2.12:	Social Indicator/Statements	71
2.13:	Environmental Indicator/Statements	75
3.1:	Theories used in Green IT Practice	84
3.2:	Methodological Approaches for Green IT Practice	87
4.1:	Distribution and Population of MSC Malaysia Status Organisations	119
4.2:	Exploratory Study Item Measurement	124
4.3:	Green IT Knowledge Item Measurement	129
4.4:	Green IT Belief Item Measurement	129

4.5:	Institutional Pressure Item Measurement	131
4.6:	Green IT Practice Item Measurement	132
4.7:	Organisational Sustainability Item Measurement	134
4.8:	Reliability Analysis for Pilot study	139
4.9:	Normality Test	150
4.10:	Analysis for Multicollinearity Test	155
4.11:	Reliability Analysis of the Research Variables	158
4.12:	EFA for Green IT Knowledge	161
4.13:	EFA for Green IT Belief	162
4.14:	EFA for Institutional Pressure	163
4.15:	EFA for Green IT Practice	168
4.16:	EFA for Organisational Sustainability	172
4.17:	Summary of the Exploratory Factor Analysis	175
4.18:	Three Categories of Model Fit	178
5.1:	Green IT Practice in Malaysia	186
5.2:	Business Area (n=323)	189
5.3:	Organisational Size (n=323)	190
5.4:	Number of IT Staff (n=323)	191
5.5:	Server Size (n=323)	191
5.6:	IT Work Outsourced (n=323)	192
5.7:	IT Worked Support (n=323)	193
5.8:	Green IT Knowledge	193
5.9:	Green IT Belief	194
5.10:	Institutional Pressure	196
5.11:	Green IT Practice	199
5.12:	Organisational Sustainability	202

6.1:	Summary of Validity Guidelines for Assessing Reflective Measurement Model	207
6.2:	The Fitness Indexes of Green IT Knowledge and Green IT Belief	209
6.3:	The AVE and CR for Green IT Knowledge and Green IT Belief	210
6.4:	The Fitness Indexes of Institutional Pressure	211
6.5:	The AVE and CR for Institutional Pressure	212
6.6:	The Fitness Indexes of Green IT Practice	214
6.7:	The AVE and CR for Green IT Practice	215
6.8:	The Fitness Indexes of Organisational Sustainability	216
6.9:	The AVE and CR for Organisational Sustainability	217
6.10:	The Fitness Indexes for All Construct	220
6.11:	The AVE and CR for Main Construct	221
6.12:	Summary of the Confirmatory Factor Analysis (CFA)	222
6.13:	The Discriminant Validity Index Summary and Correlation between Variables	225
6.14:	Fitness Indexes for the Structural Model	227
6.15:	Revised Research Hypotheses	230
6.16:	Standardised Regression Analysis	231
7.1:	Summary of Main Findings of the Study	238
7.2:	Hypothesis and Summary of Result for Green IT practice and Organisational Sustainability Dimensions	245
7.3:	Hypothesis and Summary of Result for Green IT Belief, Green IT Knowledge, Institutional Pressure Dimensions and Green IT Practice	254
7.4:	Fitness Indexes for New Model	263
7.5:	Green IT Practice and Organisational Sustainability Success	263

LIST OF FIGURES

<u>Figure No.</u>		<u>Page No.</u>
1.1:	The National Green Technology Policy	4
1.2:	Organisation of the Study	21
2.1	Stages in a Systematic Review Process	25
2.2:	Process of Identifying Relevant Literature	29
2.3:	Study Selection Flow Chart	32
2.4:	DPOBE Model	79
3.1:	Institutional Theory	90
3.2:	Belief – Action – Outcome Framework	97
3.3:	Research Proposal Model	108
4.1:	Research Approach Process	111
4.2:	A Framework for Research	113
4.3:	Deductive Approach Process	113
4.4:	Inductive Approach Processes	114
4.5:	Research Design	116
4.6:	Research Approach	117
4.7:	The Relationship Between Sample and Population	121
4.8:	Normal P-P Plots for all Research Variables	153
6.1:	Confirmatory Factor Analysis for Green IT Knowledge and Green IT Belief	210
6.2:	Confirmatory Factor Analysis for Institutional Pressure	212
6.3:	Confirmatory Factor Analysis for Green IT Practice	214
6.4:	Confirmatory Factor Analysis for Organisational Sustainability	217
6.5:	The Simplified Measurement Model for Pooled-CFA	218
6.6:	The Result of Pooled-CFA for All Constructs in the Model	219

6.7:	The Structural Model before MI	226
6.8:	The Result for All Constructs in the Structural Model	228
6.9:	Revised Research Model	229
7.1:	Components of the New Model of Green IT Practice and Organisational Sustainability	262



CHAPTER ONE

INTRODUCTION

1.1 OVERVIEW

Green IT practice plays an important role in organisational management. This practice assists the organisations to achieve its goal of sustainability by focusing on three perspectives; namely economic, social, and environmental (Triple Bottom Line index) (Slingerland & Stork, 2000). Given the relative absence of previous research on Green IT in Malaysia, the direction and orientation of this study are significantly influenced by four decades of Green IT research in Western countries.

This chapter outlines the journey of this study. It starts with the background of the study, and then continues with an overview of the implementation of Green IT in Malaysia. Next, it continues with the objective according to the problem statement of this study; what the study needs to achieve. Lastly, it outlines the contribution of this research.

1.2 BACKGROUND OF THE STUDY

Green Information Technology (IT) has become the latest buzzword in IT management, although a common understanding of the coverage and scope is still missing in research and practice (Velte, Velte, & Elsenpeter, 2008). The implementation of Green IT is a multifaceted construct that is intended to address both IT and non-IT related sustainability problems (Elliot & Binney, 2008). Moreover, the terms 'Green', 'eco-efficiency' and 'sustainability' are widely used among researchers in the field (Molla, 2009a). The importance of Green IT has been strongly suggested

through practitioner reports (Knox & Lull, 2009; Gartner, 2008; Info-Tech, 2007a, 2007b) and emerging academic articles (Chen et al., 2008; Elliot, 2007; Elliot & Binney, 2008). However, the capabilities that businesses and other organisations need to build in order to apply Green IT and the extent to which they have progressed along the path have not been reported in the literature (Molla, Pittayachawan, & Corbitt, 2009).

Investing in Green IT will lead to new economic system; supplying and servicing energy efficient equipment and developing green technology are just some of the ways in which companies can increase revenue and fuel job growth in a low-carbon economy (Berry, 2017). Studies have found that firms have invested interest in Green innovation because “going Green” helps businesses develop new market opportunities and increase their competitive advantage (Chen et al, 2008; Rennings & Rammer, 2009). Successfully implementing Green innovation helps firms to achieve greater efficiency, strengthens their core competencies, enhances their Green image and as a result may contribute to increase profitability (Chen et al., 2008). Furthermore, Murugesan and Gangadharan (2012), agreed that Green IT may require reengineering of business processes and practices, which in some instances, could be a major challenge in which companies have to address holistically. One of the challenges is the need to implement cost saving initiative in the companies. By reducing spending on equipment and energy, paper and ink, and receiving tax breaks and other financial incentives, Green IT has become a practical way for organisations to save their money. Organisations that demonstrate initiatives in this area are those that are responsive to investors and customers (Berry, 2017).

1.3 GREEN IT in MALAYSIA

The Malaysian Government under the Ministry of Energy, Green Technology and Water (MEGTW) is promoting Green technology as a main driver to accelerate the national economy and promote sustainable development. In conjunction with that, a National Green Technology Policy (NGTP) was launched in order to demonstrate that Malaysia is serious in the implementation of Green IT with an objective to intensify Green technology research and innovation towards commercialisation, promotion, and public awareness of Green technology. According to Zairah, Rahim, and Samuri (2018), there is a drastic growth of IT users in Malaysia. During 2015, 71.1% of Malaysians were internet users an increase of 57% from 2013. The percentage of computer users also increased from 56% in 2013 to 68.70% in 2015. With the fast evolution of IT industry, the numbers are expected to increase rapidly in the near future (Department of Statistics Malaysia, 2016). The increasing number of IT users in Malaysia is parallel with the increase in carbon dioxide (CO₂) emissions contributed by IT usage that in turn adversely affecting the environment. According to Gartner (2008), IT devices contribute at least 2% of CO₂ emission which is equal to the CO₂ emission in the aviation industry. As a consequence, the Malaysian government had promised to give a full commitment to reduce the level of CO₂ emissions by 40% in 2020. The statement was issued by the then Prime Minister of Malaysia, Dato' Seri Najib Bin Tun Razak in Copenhagen, Denmark in 2009.

In addition, Green technology has been the limelight of the Malaysian Public Sector ICT Strategic Plan of 2010 to 2015 (Zainal, 2010). Four pillars, namely energy, social, environmental and economic, as shown in Figure 1.1, which were adopted from Lockwood (2006), have been constituted as elements of national Green technology policy .

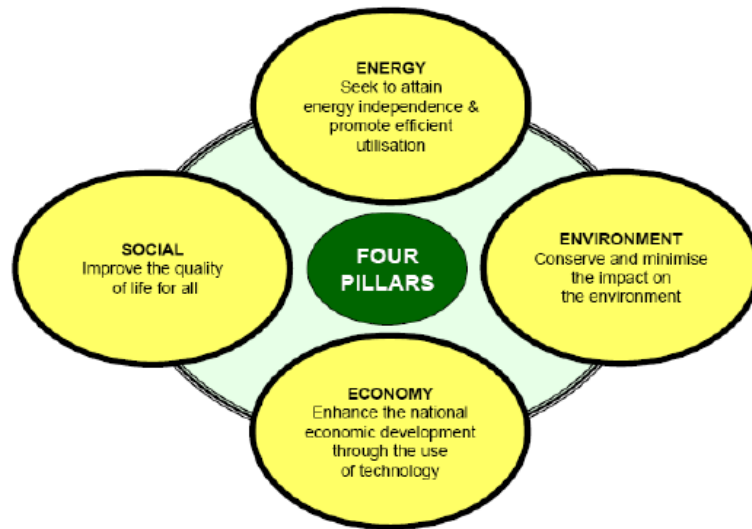


Figure 1.1: The National Green Technology Policy (Lockwood, 2006)

More recently, the 11th Malaysia Plan (2016 – 2020) outlines six strategic thrusts aimed to address the needs of the nation in staying ahead of global challenges and opportunities. One of these thrusts is “Pursuing Green growth for sustainability and resilience”, demonstrating Malaysia’s commitment to pursue development in a more sustainable manner. This research is timely because it addresses the issue that is relevant with the current focus and priority of the nation.

Green IT in Malaysia has been introduced since 2009. However, Green IT acceptance among Malaysians is still slowly progressing and this is an alarming condition. The emission of Carbon Dioxide (CO₂) in Malaysia is increasing at a worrying rate and as a result, the government aims to reduce 40% of the CO₂ emission by 2020 through the implementation of Green IT. According to Samuri (2014), the level of Green IT awareness among Malaysians is still literally non-existent. This was agreed by Raj (2008), who stated that although the concept of Green IT had been introduced to Malaysians, its practice among the public’s is still not aligned to the Green IT initiatives. The outcomes of Green IT initiatives are questionable and may

not reach the people at large. Meanwhile, Din, Haron, and Ahmad (2013), reported that the level of awareness on Green ICT is average in Malaysia.

According to Md Salleh (2010), some of the Green IT practices that have been implemented in Malaysia's MEGTW and may be necessary for other organisations include configuring computers into sleep mode when it is not in use, insuring all equipment are turned off before exiting the position, and also printing or making copies only when it is actually required. The limited literature on Green IT practices in Malaysia demonstrates that although the concept of Green IT has been introduced by the relevant authorities, supervision on the implementation is still needed. Samuri (2014), proposed a number of strategies and research that should be carried out in order to get the full advantage of Green IT practices. First of all, it is crucial to create awareness regarding the benefits of Green IT practices. Awareness is the first stage that should be undertaken to ensure the successful implementation of Green IT practices. A high level of awareness is needed to make the environment greener in a developed nation. For instance, a study on the development of a prototype system to monitor the ecological and sustainability behaviour in Malaysia's public sector conducted by Razali, Loindin, Leau, and Hanapi (2012), revealed that the level of awareness on Green IT among the users in Malaysia's government sector is poor as many of them do not appreciate the significance of Green IT practice. Besides the federal government, the local government also proposed to implement Green IT practice at its level because it aims to achieve sustainability in reducing the negative impact of IT infrastructure (Abdul Majid & Romli, 2019). Although the Malaysian Administrative, Modernisation and Management Planning Unit (MAMPU) has released Green IT guidelines, some organisations are still unaware of this matter