HUMAN FACTORS FOR SUCCESSFUL ACHIEVEMENT OF INFORMATION SECURITY IN A HIGHLY HIERARCHICAL ORGANIZATION: A CASE STUDY

Kanchana Bandara Rajapaksha

169127X

Degree of Master of Business Administration in Information Technology

Department of Computer Science and Engineering

University of Moratuwa

Sri Lanka

June 2018

HUMAN FACTORS FOR SUCCESSFUL ACHIEVEMENT OF INFORMATION SECURITY IN A HIGHLY HIERARCHICAL ORGANIZATION: A CASE STUDY

Rajapaksha Mudiyanselage Kanchana Bandara Rajapaksha

169127X

The dissertation was submitted to the Department of Computer Science and Engineering of the University of Moratuwa in partial fulfillment of the requirement for the Degree of Master of Business Administration in Information Technology

Department of Computer Science and Engineering

University of Moratuwa

Sri Lanka

June 2018

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 the University of Moratuwa the non-exclusive right to reproduce and distribute my thesis/dissertation, 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).

……. ……

(R. M. K. B. Rajapaksha) Date:

Signature of the Candidate

The above candidate has carried out research for the Master's thesis under my supervision.

…… ……

Signature of the Supervisor Date

ACKNOWLEDGEMENT

I would like to express my deepest appreciation to all those who made it possible for me to complete this research. In particular, I wish to extend my sincere gratitude to the supervisor for his constant support, guidance and encouragement, which enabled me to discover the human factors and to determine the information security industry best practices as guidelines for my current organization. He has supported and guided me throughout my research, from initial topic selection to relevant literature, from methodology to analysis, and finally in the preparation of guidelines.

I also wish to thank all lecturers and staff of the Computer Science and Engineering Department of University of Moratuwa, especially the Head of the Department, who extended their maximum support and guidance and helped me to complete my academic research on time. Finally, I would like to thank all my family members, especially my wife, for giving me their fullest support and encouraging me to complete this Degree.

I take this opportunity to thank all my colleagues who have been by my side, encouraging and supporting me through every challenge and trial of my life at the university.

This research has helped me to develop my career in the field of IT, particularly in the subject area of IS.

ABSTRACT

In modern organizations, information security is a key area of concern. To achieve information security in a methodical manner, many organizations adopt standards for the development and application of security mechanisms as well as policies. However, the use of these information security standards in the development of security techniques and policies, must take into consideration the structure and other properties that define the particular characteristics of the organization.

This research is focused on determining human factors of the successful achievement of widely used information security standards in an organization having a highly hierarchical management structure. The research for this purpose was conducted as a case study. I have selected Sri Lanka Navy as the highly hierarchical organization.

The data for the research was collected from relevant personnel at different levels within the highly hierarchical organization. Information Technology department of the highly hierarchical organization is used on behalf of the organization for the data collection due to convenience and as it represents the same characteristics. The research has involved the use of control and management of collecting information by using a self-administered questionnaire. The data collected using this research instrument was analyzed by statistical methods to validate a set of hypotheses that were created based on an identified collection of factors, which influences the determination of human factors of the achievement of information security in a highly hierarchical organization.

The independent variables are “control of work,” “delegation,” “co-operation,” “awareness” and “attitudes” and reflect good internal consistency in the data collection instrument. The dependent variable named “Human Factors for successful achievement of Information Security in a highly hierarchical organization” has similarly high internal consistency within the research instrument.

In conclusion, the most effective human factors have been identified by using aforesaid different types of analytical methods of achievement in the information security of the highly hierarchical organization.

Keywords: Highly hierarchical organization, Human factors, Information security

TABLE OF CONTENTS

Declaration			i
Acknowledgement			ii
Abstract			iii
Table of content			iv
List of Figures			vii
List of Tables			viii
List of abbreviations			ix
1.	Introduction		1
	1.1	Background	1
		1.1.1 Motivation	3
		1.1.2 Research Scope	3
	1.2	Problem Statement	4
		1.2.1 Research Objectives	5
		1.2.2 Research Significance	5
	1.3	Summary	6
2.	Literature Review		7
	2.1	Introduction	7
	2.2	Structure of Organizations	7
	2.3	Information Security Management	9
		2.3.1 Co-operation within the Organization	10
		2.3.2 Control of work within the Organization	12
		2.3.3 Awareness within the Organization	12
		2.3.4 Delegation within the Organization	14
		2.3.5 Attitude within the Organization	15
		2.3.6 Consideration of the Human Factors	16

	2.4	Summary	16
3.	Research Methodology		18
	3.1	Introduction	18
	3.2	Research Design	18
	3.3	Theoretical Framework	20
		3.3.1 Dependent Variable	20
		3.3.2 Independent Variables	20
	3.4	Hypothesis Development	21
	3.5	Dimensions	25
	3.6	Research Instrumentation	31
		3.6.1 Data Collection	31
		3.6.2 Scale	32
		3.6.3 Sample Selection	32
		3.6.4 Survey	33
		3.6.5 Data Analysis tools used	34
	3.7	Summary	34
4.	Data Analysis		35
	4.1	Introduction	35
	4.2	Demographic Analysis	35
	4.3	Reliability Analysis	38
	4.4	Correlation Analysis	41
		4.4.1 Pearson Correlation Analysis	42
		4.4.2 Anova Analysis	45
	4.5	Regression Analysis	46
	4.6	Summary	48
5.	Conclusion		50
	5.1	Introduction	50

5.2 Industry best practices to use as Guidelines 50
5.3 Conclusion 52
5.4 Summary 52
5.5 Challenges & Limitations 52
Reference List 54
Appendix A: List of Questions 58
Appendix B: Request Letter 63
Appendix C: Factor Table 64

LIST OF FIGURES

	Page
Figure 1.1: Plan, Do, Check and Act	2
Figure 1.2: Factors affecting compliance with IS standards in an HHO	3
Figure 2.1: Highly Hierarchical Organization	8
Figure 2.2: Flat Organization	8
Figure 2.3: FORISK modules	11
Figure 3.1: Research Methodology	19
Figure 3.2: Theoretical Framework	20
Figure 3.3: Relationship between Control of work via Dependent variable	21
Figure 3.4: Relationship between Delegation via Dependent variable	22
Figure 3.5: Relationship between Co-operation via Dependent variable	23
Figure 3.6: Relationship between Awareness via Dependent variable	24
Figure 3.7: Relationship between Attitude via Dependent variable	25
Figure 3.8: Dimension in Control of work variable at the HHO	26
Figure 3.9: Dimension in Delegation variable at the HHO	27
Figure 3.10: Dimension in Co-operation variable at the HHO	28
Figure 3.11: Dimension in Awareness variable at the HHO	29
Figure 3.12: Dimension in Attitude variable at the HHO	30
Figure 3.13: Likert Scale	32
Figure 4.1: Demographic Analysis of Qualifications	36
Figure 4.2: Demographic Analysis of Employment Roles	37
Figure 4.3: Demographic Age Analysis of the Employees	37

LIST OF TABLES

	Page
Table 3.1: Dimension, Item count and Scale of Dependent variable	26
Table 3.2: Dimension, Item count and Scale of Control of work variable	27
Table 3.3: Dimension, Item count and Scale of Delegation variable	28
Table 3.4: Dimension, Item count and Scale of Co-operation variable	29
Table 3.5: Dimension, Item count and Scale of Awareness variable	30
Table 3.6: Dimension, Item count and Scale of Attitude variable	31
Table 4.1: Reliability Analysis uses Cronbach's Alpha	38
Table 4.2: Cronbach's Alpha value Levels	39
Table 4.3: Reliability Analysis of the Attitude Variable	39
Table 4.4: Reliability Analysis of the Awareness Variable	40
Table 4.5: Reliability Analysis of the Control Variable	40
Table 4.6: Reliability Analysis of the Co-operation Variable	41
Table 4.7: Reliability Analysis of the Delegation Variable	41
Table 4.8: Pearson Correlation Analysis	42
Table 4.9: Attitude with Dependent Variables Analysis	43
Table 4.10: Awareness with Dependent Variables Analysis	43
Table 4.11: Control of work with Dependent Variables Analysis	44
Table 4.12: Co-operation with Dependent Variables Analysis	44
Table 4.13: Delegation with Dependent Variables Analysis	45
Table 4.14: ANOVA Analysis	45
Table 4.15: Independent with Dependent Variables Analysis	46
Table 4.16: Regression Analysis	47
Table 4.17: Regression Analysis of Control of work Variable	47
Table 4.18: Regression Analysis of Delegation Variable	47

LIST OF ABBREVIATIONS

Abbreviation	Description
ANOVA	Analysis of Variance
BYOD	Bring Your Own Device
DR	Disaster Recovery
DVD	Digital Video Disk
FORISK	Formalizing Information Security Risk and Compliance
HHO	Highly Hierarchical Organization
HH	Highly Hierarchical
IS	Information Security
IT	Information Technology
ISM	Information Security Management
IS	Information Security
ISO	International Standards Organization
ISO/IEC	International Organization for Standardization / International Electro-technical Commission
ISSM	Information Systems Security Management
ISMS	Information Security Management Standard
ITIL	Information Technology Infrastructure Library
PDCA	Plan, Do, Check, Act
SCADA	Supervisory Control and Data Acquisition
SME	Small and Medium Enterprises
SPSS	Statistical Package for the Social Sciences