

EVALUATING HUMAN FACTORS OF INFORMATION SECURITY
AWARENESS IN TAIBAH UNIVERSITY

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DEDICATION

This thesis is dedicated to my father, who taught me to give the best of me and do my task generously and honestly to achieve a quality job. I also dedicate this thesis to my mother, who taught me that patience and persistence along with commitment are the propellers of success. To my children whom I always wanted them to learn that it is never late to learn or start all over. To a good friend who taught me to take advantage of bad times. To a life partner who couldn't make it all the way along with me.

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ABSTRACT

Information security for organizations such as educational sectors is gaining more importance as the implementation of technical solutions deployed to increase business efficiency. Information security technological implementation is insufficient to withstand threats that evolve with wider implementations of technologies the more technology is implemented the more threat probability pushes in. The fact that information security relies on three ties which are the technology, process and people. Processes can govern people behaviour by policies, however people still need a broader understanding of process and technology to be aware of expected threats and how their attitude and behaviours are going to evolve. Information security awareness indicates the understanding and behaviour of in information security. The information security awareness of employees should be measured to improve control strategies such as training or to determine the security maturity of an organization. In this research an adequate instrument, the Human Aspects Information Security Questionnaire (HAIS-Q). This instrument was administered to employees and students of Taibah University by an online web-based survey testing the knowledge, attitudes and behaviour across the models seven policy-based focus areas. Initial results indicate that HAIS-Q to be valid, reliable and suitable for comparable analysis. The model is able to measure information security awareness in its seven coverage focus areas. Results obtained indicated above average ISA level on tested sample using HAIS-Q model .

ABSTRAK

Keselamatan maklumat untuk organisasi seperti sektor pendidikan semakin penting memandangkan pelaksanaan penyelesaian teknikal yang digunakan untuk meningkatkan kecekapan perniagaan. Perlaksanaan teknologi keselamatan maklumat tidak mencukupi untuk menahan ancaman yang berevolusi dengan pelaksanaan teknologi yang lebih luas, semakin banyak teknologi yang dilaksanakan semakin banyak kemungkinan ancaman ancaman. Fakta bahawa keselamatan maklumat bergantung pada tiga ikatan yang merupakan teknologi, proses dan orang-orang. Proses boleh mengawal perilaku orang oleh dasar, namun orang masih memerlukan pemahaman yang lebih luas tentang proses dan teknologi untuk mengetahui ancaman yang diharapkan dan bagaimana sikap dan tingkah laku mereka akan berubah. Kesedaran keselamatan maklumat menunjukkan pemahaman dan tingkah laku dalam keselamatan maklumat. Kesedaran keselamatan maklumat pekerja harus diukur untuk meningkatkan strategi kawalan seperti latihan atau menentukan kematangan keselamatan organisasi. Dalam kajian ini instrumen yang mencukupi, Soal Selidik Keselamatan Maklumat Aspek Manusia (HAIS-Q). Instrumen ini diberikan kepada pekerja dan pelajar Universiti Taibah oleh kaji selidik berasaskan web dalam talian yang menguji pengetahuan, sikap dan tingkah laku merentasi model tujuh bidang tumpuan berasaskan dasar. Keputusan awal menunjukkan bahawa HAIS-Q adalah sah, boleh dipercayai dan sesuai untuk analisis setanding. Model ini dapat mengukur kesedaran keselamatan maklumat dalam tujuh bidang fokus liputannya. Hasil yang diperoleh ditunjukkan di atas purata tahap ISA pada sampel yang diuji menggunakan model HAIS-Q.

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LIST OF ABBREVIATIONS

H AIS-Q	-	Human Aspects of Information Security Questionnaire
IDS	-	Intrusion detection systems
InfoSec	-	Information security
ISA	-	Information Security Awareness
KAB	-	Knowledge-Attitude-Behaviour
KSA	-	Kingdom Of Saudi Arabia
NIST	-	National institute of Standards and Technology
SNS	-	Social network site
UTM	-	Universiti Teknologi Malaysia

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CHAPTER 1

INTRODUCTION

1.1 Introduction

This research is only limited to measure information security awareness (ISA) in Taibah University. Taibah University is one of the large Saudi Arabian universities located in Madinah, Saudi Arabia. The research uses Taibah University as a case study. Taibah University is increasing in size of facilities, number of staff and students. Measuring information security awareness in this university will give an indicator of information security awareness level among the students, staff and lecturers in this university. This will be enabling its management to evaluate information security threats attributed to human aspects. The research can also be used as an indicator of information security improvement for the country compared to earlier researches which indicated very low level of information security awareness in Saudi Arabia. This research will analyze human factors of information security awareness in Taibah University. Although the university has a modern infrastructure and deploying the latest information technology solutions; human factors must be considered as an important construct of information security in any organization.

1.2 Problem Background

Taibah University is an emergent Saudi University in the country. Many of the university facilities and resources are reliant on computer systems to provide optimal educational environment for the students as well as assisting lecturers in the delivery of intended curriculum. An organization of such magnitude of members and large

information system must be securely protected against any information security threat. Information security awareness is to be assured and nourished to avoid devastating information security catastrophes attributed to human errors or lack of awareness. As more technology embedded educational solutions and aids push their way to reside in Taibah University taking the place of traditional learning, the information security threats push along to compose a challenge to information security. The last few years witnessed an increasing interest in transition to new educational environments where technology solutions are utilized to shape new educational era that is more efficient and suitable for students learning outcome regardless of their location and time of attendance. Self-dependent learning, researches, active argumentation and remote learning have shifted the emphasis from the traditional model of fixed classroom involving face-to-face instruction to a more flexible model considering students' pace and attendance of either part or full time.

The increased importance of computer systems combined with the availability of the Internet led to the creation of various business applications and services such as Electronic Commerce, Electronic Government, and Online Learning or Education. As a consequence of this universal networking and the extending reach of organization beyond its traditional limit, and with the Internet allowing for a wide variety of undesirable activities, Information Systems Security are considered an important issue (European Security Forum, 1993). Knowing these facts dictates that all information technology systems' users must be fully aware of technical and legal consequences of an information security incident.

1.3 Problem Statement

Many Saudi Arabian government sectors including universities lack proper information security awareness. Many computer security violations occur usually due to human errors either deliberate or undeliberate. Computer misuse is another security violation that mitigate information security. This requires full user awareness of information security threats. Taibah University have sustained several attacks in the last

few years, where some attacks caused a complete system isolation. The WannaCry ransomware attack and Shamaon worms' defects were example of such incidents. More over some of the university resources had been penetrated or hacked several times, example of that is the university forum hacked by a student. IT personnel at Taibah University believe that lack of information security awareness among the staff or students was one main causes. Unfortunately, there is still no study to target information security awareness level among employees and student in Taibah University. This research will measure ISA awareness in Taibah University. Knowing ISA level and weakness points will help the university to tailor ISA programs that patches weakness in a more efficient way that targets weak personnel regarding ISA.

1.4 Research Objectives

This study objectives is limited to accomplish the following three goals:

- i. To examine and quantify the information security awareness factors related to human, knowledge, attitude and behaviour for staff and students of Taibah University.
- ii. To measure information security awareness level of Taibah University staff and students.
- iii. To verify if knowledge has a positive effect on attitude and behaviour for Taibah University staff and students.

1.5 Scope of the Research

The scope of this research focuses on the evaluating human factors of information security awareness in Taibah University using HAIS-Q model.

1.6 Significance of the Research

It is well known worldwide that universities have been always an appealing target for hackers and other adversaries. Taibah University was built up at the period of time where technology was advanced. This enabled the university to build up a robust infrastructure where older universities just upgrade their IT services. This makes the university appeal to intruders to either utilize resources inside campus or challenge the new technology. Hackers find users awareness limitation a chance to exploit or use as a bridge to get into the system.

This research will enable Taibah university management to estimate the level of information security awareness in their premises. Which makes it possible for them to proactively develop or purchase an awareness program for all of university members. The university's management will also be aware enough about information security threats attributed to human factors.

This research contributes to the body of knowledge as it addresses the identified gaps of information security awareness in the case study. Literature and Information collected will help future researchers to have a broader idea about the subject. The exploratory study in Information security awareness carried out by this research in Taibah University is expected to contribute in the stimulation of a better understanding in regard to information security awareness. The study will participate in reduction of capitals lost by attacks consequences. Employees cognitive toward legal issues will increase when participating in the survey of Information security awareness questionnaire of this study or subsequent awareness programs offered based on the obtained results.

1.7 Research Questions

The general idea of the research is to add a contribution toward information Security awareness effective measurement as well as to explore the levels of Information security awareness of Taibah University in KSA. To reach a recognized and valid result for this claim the research addresses the following research questions:

1. What is the level of IT security awareness in Taibah University?
2. How can the information security awareness in Taibah University be evaluated?
3. Which method to be used to measure information security awareness in general?
4. What is the effect of knowledge, attitude and behaviour on staff and students regarding information security awareness?
5. Which factor to select on the research case study?
6. Which information security awareness evaluation model to choose for Taibah University in Saudi Arabia?

1.8 Research Organization

The research is organized in 6 chapters illustrated and summarized below.

Chapter 1 is an introductory chapter which contains the rationales and motivations behind the research.

Chapter 2 is the literature review required to build research area background based on earlier studies.

Chapter 3 in this chapter an exploration of research method and research phases. It contains the operational framework, research plan and used instruments in the research.

Chapter 4 is the design and implementation which discusses the proposed research model and research hypothesis. It elaborates on steps required to achieve the research goal.

Chapter 5 is the findings and analysis of the research. This chapter discusses results of various tests obtained in this research along with ISA level result in Taibah University.

Chapter 6 is the conclusion chapter where a summary of research findings, limitation of the study, future recommendation and contribution of this research are discussed.

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