

CHAPTER V

CONCLUSIONS AND FUTURE WORKS

5.1 Introduction

With the increasing dependence on information system, it has become clear that the protection of these systems is a necessity for every organisation. Lack of security awareness and practice of the employees are the weakest link in information security (Halim et al., 2008). Several studies emphasized the need to increment the security awareness of employees within the organisation by focusing on policies and procedures referring to technology, as well as, educating the employees on information security by providing training programs to create a security culture among employees (Ishak et al., 2014; Fakeh et al., 2012).

This study investigated security awareness and practice of the employees both in workplace and home and the factors that could potentially influence the security awareness and practice. In order to address the research problem, two research questions were formed:

Q1. How may the factors of policy, behaviour, training, knowledge of technology and education influence the security awareness and practice both in workplace and home?

Q2. What is the current awareness and practice level of information security among employees in USIM?

5.2 Discussion of the Major Findings

To address the first research question, a comprehensive review was conducted on the security awareness and security practice literatures, in order to identify and evaluating the targeted factors for evaluating information security awareness and practice in workplace and home. The current study aimed to take a further step in the literature analysis by endeavoring to identify elements that influence security awareness and security practice of employees both in workplace and home as investigation in this scope is still limited.

This study was confined to five key factors in order to limit its scope. These key factors are policy, behaviour, training, knowledge of IT and education, that might effect security awareness and security practice, which may assist USIM to develop security awareness among their employees.

This study proposed that these factors would have a positive influence on an employees' security awareness and security practice both in workplace and home in order to help USIM employees to focus on the areas that need to be developed to increase security awareness and practice for both workplace and home. The survey instrument was distributed manually with a goal to obtain 300 usable survey results. A total of 305 questionnaires was collected back as 285 ones were usable and the rest were not due to incomplete answers both in workplace and home. The demographic

data indicated that 45% of the respondents were male, while 55% were female. The majority of the respondents were Malay (99.3%), while (0.7%) were others, 38.6% of the respondents were academic staff, while 61.4% were administration staff. 26% of the respondents hold bachelor degree, while 25% of the respondents hold diploma degree, 22% of the respondents hold PhD, 15% of the respondents hold certificates (i.e. SPM, STPM, etc.) and 12% of the respondents hold Master degree.

In this study Pearson Correlation and Linear Regression were used to determine the relationship between the independent variables and the dependent variable. In terms of policy factor, the need for security policy is strongly emphasized by previous studies, implementation of security policies is critical to organisations as it ensures the confidentiality, integrity and availability of information system (Goel et al., 2010).

Pearson Correlations found to be ($R = .684$) between security awareness at workplace and policy with a Linear Regression of ($p = .001$). Pearson Correlations found to be ($R = .344$) between security awareness at home and policy with a Linear Regression of ($p = .040$). This indicated that there is a moderate positive relationship between policy and security awareness both in workplace and home.

In terms of security practice, Pearson Correlation found to be ($R = .696$) with a Linear Regression ($p = .001$) between security practice at workplace and policy. Pearson Correlations found to be ($R = .426$) with a Linear Regression of ($p = .001$) between security practice at home and policy. This indicated that there is a moderate positive relationship between policy and security practice both in workplace and

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home. This indicated that the policy is considered as a guideline to employees concerning information security that can give rules and regulations of the importance of information security, policy can ensure the protection of sensitive information. To this end, policy can contribute to increase security awareness and security practice of employees within their organisations also on a personal security awareness. Therefore, hypothesis 1 is accepted.

In terms of behaviour factor, security failures in organisations could be the result of staff poor security behaviour, behaviour is the result of making decision and process that might lead to security breaches. Modern organisations depend on reasonable behaviour of their staff to avoid the security threats that could occur from insider (McIlwraith, 2006).

Pearson Correlations found to be ($R = .593$) with a Linear Regression of ($p = .001$) between security awareness at workplace and behaviour, also Pearson Correlations found to be ($R = .479$) with a Linear Regression of ($p = .009$) between security awareness at home and behaviour. This indicated that there is a moderate positive relationship between behaviour and security awareness both in workplace and home.

In terms of security practice, Pearson Correlation found to be ($R = .582$) with a Linear Regression of ($p = .003$) between security practice at workplace and behaviour, also, Pearson Correlations found to be ($R = .512$) with a Linear Regression of ($p = .001$), between security practice at home and behaviour. This indicated that there is a moderate positive relationship between behaviour and security practice both in

workplace and home. A good behaviour of employees when dealing with information assets can ensure the protection of sensitive data. In addition, a good behaviour towards security practice contributes to increase security awareness among employees both in workplace and home. Therefore, hypothesis 2 is accepted.

In terms of training factor, effective security awareness training is a significant tool to enhance information security within organisation, training is one of the fundamental countermeasures for defending information and data, to reduce the security risk that could be caused by the employees themselves. Training enables the employees to know their responsibility toward protecting information system which will elevate the employee's security awareness (Mellwraith, 2006; Hight, 2005).

The result in this study indicated that there is a small positive relationship between training factor and security awareness both in workplace and home. Pearson Correlations found to be ($R = .376$) with a Linear Regression of ($p = .142$) between security awareness at the workplace and training. In addition, Pearson Correlations found to be ($R = .397$) with a Linear Regression of ($p = .885$), between security awareness at home and training. This indicated that training has no significant effect on security awareness at the workplace and home ($p > .05$).

In terms of security practice, Pearson Correlation found to be ($R = .484$) with a Linear Regression of ($p = .064$) between security practice at workplace and training. In addition, Pearson correlations found to be ($R = .402$) with a Linear Regression of ($p = .359$) between security practice at home and training. This indicated that training has no significant effect on security practice in workplace ($p > .05$). Therefore,

hypothesis 3 is rejected as ($p > .05$). This findings is with contrast to the previous literature that indicated training programs enhance security awareness and practice of an employee's. The respondents style on answering the questions and the way questionning could be the reasons lie beyond this negative relationship between training and security awareness and practice both in workplace and home.

In terms of knowledge of IT, universities rely on information technology to operate and manage records, (e.g., electronic records). IT technology assists employees in their daily work but could cause damage if misused. Security technology refers to the technology that is used to protect information assets such as using a firewall so the use of technology depends on the employees' implementation to such technology. Therefore, knowledge of IT protects the information assets by reducing the number of errors when the employees use IT in universities (Humaidi & Balakrishnan, 2012; Fakeh et al., 2012).

Pearson Correlations found to be ($R = .655$) with a Linear Regression of ($p = .001$) between security awareness at workplace and knowledge of IT. In addition, Pearson Correlations found to be ($R = .448$) with a Linear Regression of ($p = .001$) between security awareness at home and knowledge of IT. This indicated that there is a moderate positive relationship between knowledge of IT and security awareness both in workplace and home.

In terms of security practice, Pearson Correlation found to be ($R = .606$) with a Linear Regression of ($p = .006$) between security practice at workplace and knowledge of IT. In addition, Pearson Correlations found to be ($R = .447$) with Linear Regression

of ($p=.001$), between security practice at home and knowledge of IT. This indicated that there is a moderate positive relationship between knowledge of IT and security practice both in workplace and home. Security awareness and practice could be increased by reducing the misuses of technology within organisations as well as personal use of technology. Therefore, hypothesis 4 is accepted.

In terms of education factor, educating employees about the importance of information security is critical of any organisation also for home users. Education combines the security skills and various functional competencies into a common body of knowledge, education can influence employees' security awareness and practice for example educating the employees on the malicious software will increase their knowledge of the risk caused by malicious software. Staff can obtain education on information security during campaigns, seminars, discussions and others (Fakeh et al., 2013; Wilson & Hash, 2003).

Pearson Correlations found to be ($R=.677$) with a Linear Regression of ($p=.004$) between security awareness at workplace and education. In addition, Pearson Correlations found to be ($R=.630$) with a Linear Regression of ($p=.001$) between security awareness at home and education. This indicated that there is a positive moderate relationship between education and security awareness both in workplace and home ($p<.05$).

In terms of security practice, Pearson Correlation found to be ($R=.682$) with a Linear Regression of ($p=.014$) between security practice at workplace and education. In addition, Pearson correlations found to be ($R=.670$) with a Linear Regression of

($p=.000$) between security practice at home and education. This indicated that there is a positive moderate relationship between education and security practice both in workplace and home. Therefore, hypothesis 5 is accepted.

In order to address the second research question, descriptive statistical analysis was conducted to investigate the current level of security awareness and practice among the employees both in workplace and home. The results indicate that security awareness at workplace with (2.71) and at home with (2.70); and security practices at workplace with (2.65) and at home with (2.63) are considered at a high level. The level of security awareness both in workplace and home is higher than the level of security practice both in workplace and home. This may be due to the fact that employees are aware but not practicing.

5.3 Achievement

Information security awareness of employees needs to be constantly developed as security awareness campaigns initiatives and training programs are important to increase the awareness and practice of the users both in workplace and at home. Therefore, employees can practice the proper security behaviour in their workplace and home and also increase their IT knowledge rather than remaining ignorant in this area. With respect to the research objectives stated in Chapter 1, achievements for each objective are discussed below:

1. To investigate the effect of policy, behaviour, training, knowledge of technology and education on information security awareness and practice in both workplace and home.

A comprehensive review of literature in Chapter 2 shows that there is little known about the factors that effected security awareness and practice both in workplace and home, this study investigated the effect of policy, behaviour, training, knowledge of IT, and education on the security awareness and practice both in workplace and home. This study conducted on 285 respondents who are academic and administrative employees. The current study extends the area of investigation by exploring the security awareness and practice both in workplace and home. Correlation and Regression analysis in Chapter 4 indicated that all factors effected security awareness and practice both in workplace and home except training. However, the factorial of influential strength on the security awareness and practice varied. To this end, all the key factors are considered significant to increase the security awareness and practice among employees except pf training factor.

2. To investigate the information security awareness and practicing level among USIM employees based on the identified factors.

In order to investigate the level of security awareness and practice among the employees both in workplace and home, respondents were asked to answer the same set of questions. The result obtained from the descriptive analysis in Chapter 4 indicated that respondents' level of security awareness and practice in workplace is higher than that in home.

5.4 Limitations

This study has two major limitations. The first limitation is the focus was only on one higher education institution in Malaysia which is USIM, thus, it would be more

effective to extend this study and apply it on various universities in Malaysia to obtain different outcomes based on their security awareness and culture. The second limitation is that, this study was purely quantitative so extending the study approach to mixed mode quantitative and qualitative by using other forms such as interviews or focus groups might be more effective to provide conclusive rather than indicative results.

5.4 Recommendations for Future Research

Future research may include the following:

- This study focused only on the higher education and USIM is chosen as a sample. It is recommended to extend the research environment to the developing countries, as investigation in this area is too limited, and a comparative analysis with other developed countries experiment such as Europe, US is very interesting.
- Expanding the proposed conceptual framework of the security awareness and practice through including further factors such as personalized learning, culture and religions, and investigating the influence of these factors on security awareness and practice.

5.5 Summary

Information security awareness and practice required improvement especially for home users so that users become more aware of the necessity to practice good behaviour in their daily activity. This study reviewed the existing knowledge on

security awareness and practice and was confined to the key five factors which are; policy, behaviour, training, knowledge of IT, and education. The survey instrument was developed to measure the perception of the independent variables and their relationship with the dependent variable, the survey instrument was validated through determining the reliability test. The data collected through 285 usable surveys that were completed by USIM employees. The study findings indicated that only policy, behaviour, knowledge of IT and education have positive relationships with security awareness and practice both in workplace and home. Based on the result of Pearson Correlation analysis, the results indicated that there is a small positive relationship between training and security awareness and practice both in workplace and home. However, the result gained from linear regression analysis were not significant ($p > .05$), this may be due to the fact that the level of respondents understanding to answer the questions and the way of questioning. Overall, respondents have a high level of security awareness and practice both in workplace and home, however, the level of security awareness and practice in the workplace is slightly higher than the security awareness and practice at home this may be due to the fact that employees are likely to increase their awareness in the organisation as the security policies, procedures, law and regulations are available within the organisations. Further investigation is required especially with the training factor. It is suggested that universities should develop a security awareness training programs which elevate the employees' awareness and practice both in workplace and home.