Exploring Studies of Information Security Culture in Malaysia

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Abstract

The cultivation of Information Security Culture (ISC) in organization would assists information security management in terms of improving employees' security behavior in dealing with information assets. Many studies have been done to explore and investigate ISC in various aspects including the concepts, factors, challenges and particular applications related to assessment of ISC in an organization. However, there is no an indication on the current status of ISC studies that have been done in Malaysia. This paper will discuss these matters to provide a clear picture of the ISC studies in Malaysia and analyze particular areas that need to be further explored. It revealed that there are many areas and issues still not being comprehensively examined and series of studies need to be done so that better solutions relating to the ISC issues in Malaysian organization could be formulized.

Keywords— Information Security, Information Security Culture, Malaysian Organization

1.0 INTRODUCTION

There are many definitions of Information Security Culture (ISC) in literature. It refers to the belief of individual employees on the value of complying with information security standards and policies [1]. It includes all socio-cultural measures that support technical security methods, so that information security becomes a natural aspect in the daily activity of every employee [2], [3]. The latest definition by [4] refers ISC as the collection of perceptions, attitudes, values, assumptions, and knowledge that guide the human interaction with information assets in [an] organization with the aim of influencing employees' behavior to preserve information security.

Scholars believed that the cultivation of Information Security Culture (ISC) would provide many benefits to the organizations. Among others, ISC will help organization in managing the human factor [5]–[7] by guiding and influencing security behavior of employees in interacting with information technology (IT) systems to avoid actions that may cause risks to the security of information assets or the IT systems [8]–[10]. At the same time ISC could help organization by promoting improvement in information security practice [5] and compliance behavior of employees towards Information Security Policy (ISP) [11].

There were some significant findings related to the ISC in particular studies. Among these findings are regarding the ISC model and factor [12], ISC in small size organization [5], relationship of ISC with information security practices [13], relationship of ISC with security behavior [14] and particular applications related to the assessment and evaluation of ISC in an organization [15], [16].

There were several studies have been addressing the ISC issues in various context in Malaysia. As mentioned earlier, ISC is an important element to be cultivated in an organization to promote security behavior and

information assets. However, there is no indication on to what extend those studies have been done in exploring ISC in Malaysia organization context. This paper explores and analyzes those studies to answer the following research questions of; (1) to what extend these ISC studies have been done in the context of Malaysian organization, and (2) what are the gaps or issues that still not been explored and need to be investigated.

The next sections will discuss the methodology used in this paper. We then present and discuss the results of ISC studies that have been done in Malaysia. This will be followed by the discussion on the analysis of the ISC issues and areas in Malaysia that still not being explored and we then suggest particular areas that need to be studied specifically in the Malaysia context. We conclude this paper by providing a conclusion on the findings of this study and inform our next stage of research direction.

2.0 METHODOLOGY

This study is all about to explore and analyze any related ISC studies that have been done in the context of Malaysian organizations. Relevant literature is identified and selected by conducting a structured literature search, as the quality of a literature review strongly depends on the search process [17].

The online database of ScienceDirect, IEEEXplore, SpringerLink, ACM, Wiley, Emerald, as well as direct searching in Google Search Engine have been used to find all articles related to ISC studies in Malaysia. The search criteria was based on keyword or combinations of keywords of specific terms such as "Information Security Culture", "Security Culture", "Information Security Culture in Malaysia", "Security Culture in Malaysia" and "Security Culture in Malaysian Organization". The other inclusion criteria included are:

1. The article or study must directly involved ISC aspects and in relation to Malaysia context
2. The paper must be written in English

The selected studies will be analyzed accordingly to find the aspects, objectives and findings of the studies. These particular items then will be further analyzed and compare with the various findings outside the Malaysia context to find the gaps in terms of areas and issues that still not being covered. Number of ISC research areas and issues to be further studies will be discussed.

3.0 RESULTS AND DISCUSSION

These sections will discuss the findings in terms of ISC studies in Malaysia and analyze the issues to be further explored.

3.1 Studies of Information Security Culture in Malaysia

The study of ISC in Malaysia was started by [18]. Specifically in this initial study, he was conducted a review to academically overview and justifies the conceptual and methodological decisions in

investigating the challenges involve to cultivate ISC in Malaysian organization. The findings of this study had been used in his next study by using Malaysian Administrative Modernization and Management Planning Unit (MAMPU) as case study and unit analysis [19]. He found that inappropriate security practices were the most challenges issues in Malaysian organization. This issue has resulted in an increase in security incidents caused by employees or insiders. He argued that these were because of security policy may be either not fully understood or irrelevant to the actual security practices of an organization. He then suggested that by interpreting the basic assumptions of the insiders involved will help develop an information security culture within the organization, which in turn can help reduce internal security incidents.

[20] in their attempt to study the ISC in Malaysian Health information System (HIS), have developed a conceptual model of ISC based on the factor influencing ISC from the literature. Specifically, this conceptual model consisting the factors of Behavioral, Change management, Information security awareness, Security requirements, Organizational system Knowledge and Knowledge. To the best of our knowledge there is no empirical finding have been published to prove the factors constructing the model. [21] also have constructed ISC model based on ISC factor from the literature in examining the factors that contribute to the information security culture among ICT librarians. In this study they found that Principles is the most significant factor influencing ISC from other factors of Organizational Behavior Tier, Culture Level and Security Control.

[22] recently conducted a study to investigate the relationship between security culture and Knowledge Management (KM). As a result, they have constructed a model of this relationship to be examined in selected healthcare organizations in Malaysia. Apart from that, they previously have developed a model to study the relationship of ISC with knowledge sharing. Another study that investigate the relationship of ISC with particular aspects is [23]. They conducted this study to investigate the role of key resistance factors in knowledge sharing towards information security culture in healthcare organization. Table 1 summarizes all the ISC studies with their objectives and findings respectively.

Table 1 Summary of ISC Studies in Malaysia

Study	Objective	Findings
[18]	To overview and justifies the conceptual and methodological decisions in investigating the challenges involve to cultivate ISC in Malaysian organization.	• Interpretivism paradigm - main strategy in inquiry. • Data collection - questionnaire survey, semi-structured interviews, reviews of information security documents and observations.

	MAMPU is the case study.	• Conceptual framework based on Schein's (1992) model of organizational culture -to guide the data collection techniques
[19]	To examine the challenges involved in the development of an information security culture within a public sector context in Malaysia focusing on organizational and cultural aspects of information security.	• Inappropriate security practices result in an increase in security incidents caused by insiders. • Security policy may be either not fully understood or irrelevant to the actual security practices. Interpreting the basic can help develop an information security culture within the organization
[20]	To propose a conceptual model of ISC to be applied in HIS	Conceptual model of ISC based on the factor influencing ISC from the literature. This model will be validated in HIS in Malaysia.
[21]	Investigate the factors that contribute to the information security culture among ICT librarians	Principles, which is ISP is the most significant factor of ISC
[23]	To identify security culture and security awareness as the basic non-technical factors for IS security effectiveness models in the healthcare domain	From the relevant literatures, the authors have develop a framework for HIS security effectiveness based on Security Culture and Security Awareness
[24]	To investigate the role of key resistance factors in knowledge sharing towards information security culture in healthcare organization	Conceptual model consisting key resistance factors was proposed. This model will be tested in selected healthcare organizations in Malaysia
[22]	To investigate the relationship between security culture and KM	Conceptual model of relationship between knowledge sharing with ISC. This model will be tested in selected healthcare

3.2 What We Still Don't Know About ISC in Malaysia

From the particular studies of ISC for various purpose have been done in Malaysia, we could considered that there are many more issues and aspects of ISC need to be examined in the context of Malaysian organization to give clear understanding of the subject. Table 2 show areas that have been explored with the emerging issues need to be examined further. First and foremost, is regarding the factor and the model of ISC in Malaysian context. In both studies of [20] and [21], the factors were presented in the form of ISC model. The issue is that the factors that have been discovered in these studies were obviously different between them. Although they [20], [21] formulizing these factors from the same approach, which is through literature review, most the factors discovered in their studies were not the same. According to Table 2, only factor of security requirement of [20] can be considered identical with security control of [21]. Furthermore, factors or model of [20] were not supported with any empirical results particularly in the context of Malaysian organization even though they have come out with another conceptual ISC model consisting ISC factors [25]. A series of comprehensive studies should be done in narrowing this gap and issues so that a strong foundation of factor and conceptual model of ISC can be developed particularly in the context of Malaysian organization.

Table 2 Areas of ISC Studies and Issues to be further explored

Area of ISC have been Studied	Findings	Gap/issues
Challenge in ISC	Inappropriate security practices [19]	The study done in 2007.
Factor of ISC	Behavioral, Change management Information security awareness, Security requirements, Organizational system Knowledge and Knowledge [20]	Not empirically tested
	Principle, Organizational Behavior Tier, Culture Level, Security Control [21]	Different factors of ISC compare to [20]
Conceptual Model of ISC	Based on key factor of ISC [20]	Not empirically tested
	Based on key factor of ISC [21]	Different factors of ISC Model

		compare to [20]
Domains of Organization have been examined	Health, Public Organization	Academic, Government Linked Companies (GLC)
Relationship of ISC with Knowledge Sharing	Conceptual model consisting factors (behavior, lack of trust, lack of communication, low security awareness, personality differences, cultural differences, lack of top management commitment, and openness to experience) influencing knowledge sharing in relation to ISC	Not empirically tested
Relationship of ISC with Knowledge Management	Conceptual model consisting factors (knowledge creation, knowledge sharing, and knowledge use) in relation to ISC	Not empirically tested
ISC role in security effectiveness for HIS	Theoretical model is proposed according to users' awareness and users' culture for HIS security	Not empirically tested

Secondly is in terms of challenges faced by Malaysian organizations in cultivating the ISC. Since the study of [19] has been carried out in 2007, a latest study must be conducted to find the new possibility of challenges because from 2007 until 2015 is a very long time period and since then, there were many changes happened to the organizations from the various aspects. In addition for the next issue is, future studies should also consider various domain and different size of organization. This is due the facts that the culture of information security is found to be different according to organization domain [26], [27] and organization size [5], [27]–[30]. The investigation on these aspects of ISC will give richer outputs and findings towards particular culture of information security in the various types and size of organizations in Malaysia.

Finally, according to the Table 1, all the studies of ISC relationship towards particular aspects of knowledge sharing, knowledge management and security system effectiveness have yet being empirically tested. Whilst it is important to get these empirical results and findings, ISC relationship towards other aspects should also be explored as been done in other countries and cultures. Among these aspects including information security behavior [14], compliance behavior [31]–[33] and ISC validation and assessment applications [15], [34].

However, the aforementioned issues were based on the findings from available studies that have been done until 2015. Apart from that, there are many more issues need to be investigated in relation to ISC in Malaysia. Among the important one is the current status of perceptions and awareness of Malaysian employees toward ISC concept and implementation in Malaysia. An indication of these aspects will show how Malaysian organizations have so far reacted to the ISC. This result then will be acted as reference for the practitioners and starting point for the future studies to be taken.

4.0 CONCLUSION

There were several studies have been done to examined ISC for particular aspects in Malaysia context. As compare to studies have been done in other countries, this paper found that there are still many areas and issues of ISC need to be explored to better utilize and optimize the benefits it can provide specifically to Malaysian organizations.

Acknowledgement

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