

Identification of Factors Affecting Governance of Data Security in Higher Education

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ABSTRACT

Governance of data security in higher education is the data management mechanism that has to be practiced in all higher education. It is to have an appropriate management that employees in the organizations will understand the role to be played to secure confidential data. This paper aims at identifying the factors affecting governance of data security in higher education. It is to discover the issues in the management and the governance of data security in the higher education. Based on the literature review, new research model with eight factors were proposed for data security governance practices. Based on the research findings, a governance model was derived and proposed for higher education.

Keywords : Factors; Governance; Data Security; Higher Education

I. INTRODUCTION

Governance in the data security is about managing to protect the data in a secured manner. Management implements and makes specific decisions but involvement, accountability and decision rights are about security governance where both security and management are different [1]. Having responsibility, accountability and proper internal controls will protect informational assets in organizational structure by the information systems security governance [2]

Data governance states that proper security policies in information systems security governance are crucial. In the organization, faculty staffs need to have responsibility and accountability towards information security which is a sense of ownership [3].

The research has shown the governance of information security focuses in various fields. It is similar to the governance of data security. Every element concentrates on the security of data in whichever applications are being implemented and use by the entire user which has become a major importance. This is the main concern, in the sense that proper governance has to be established in

order not to have breach of data that will be violated without the knowledge of the user. This research will provide valuable governance to the faculty staffs in the higher education industry. It is to have a better understanding and be aware of the common factors that affect the governance in the area of data security. These data governance values have to be practice in the higher education to improve the governance and responsible for the directing and controlling issues of the organization [4].

This paper identifies the issues in management, factors affecting data security governance and propose data security governance model for better data security in higher education industry.

II. LITERATURE REVIEW

This paper focuses on the data security problems that occur in the higher education. Data security governance enhances tight security of governance in the higher education.

Importance of data security

Protecting information assets from being loss, damage, unauthorized access, operational breakdown, inaccessibility and misuse are the protection under the information security. Every data has important value compared to hardware device that data can be accessed by authorized user and unauthorized user at the same time which can cost high risk to security of the data [5].

Implementing a strategy for the information security in higher education that will meet the business objectives, needs and goals is imperative [4]. Important assets in the organization need to be protected by implementing the information security governance [6]. Institutions have to handle and give importance to the information security in order to secure information assets [7].

Benefits of data security

Data security starts from beginning of data transmission; until it will be safe and secured. Encrypting important data and granting access to authorized users to access data is one of the ways to protect the data [8] that will improve the operational effectiveness in the institution [4]. Hence security governance is partly based on the business processes in the organizations.

Challenges of data security

Access to related data must be strictly limited only to authorized users; otherwise, the privacy could be abused. Authentication problem can lead to invalid data [9]. New security criteria are needed to treat the threats on any system architectures that are affected [8]. The entire components of information system need to be secured, such as the data in the database management system. This is required when dealing with threats and outdated information security controls [10].

Challenges in the data security comes in the form of unauthorized access, faculty staffs may not be aware of data breach, mobile computing use and careless in misusing data [11]. Organization should provide training for all employees handling data, however financing the training is an issue in most of the organization [12].

Without the management support, accessing to resources legally or illegally can cause problems to the organizations [4]. Attacks on the information systems

and services can lead sabotage, crime, fraud, revenge, harassment and identity theft for the purpose of intellectual property or money. The desired place for the hackers to attack is the university environment which they can easily obtain confidential data [7].

Governance of data security in higher learning education

The governance in higher education includes formation of policies to monitor the work of the organization on a daily basis in the management or administration of the organization. Resources that need access requires conditions to control the access and key being generated, which permit the system to decrypt the resources.

Security and privacy of data are being risked when data are shared across system and data should be given assurance that it will be governed in a secured way with their policies [13]. Various framework has been created to describe who can proceed, what actions with what information, when and under what conditions and what methods [8]. Development with the Information Technology (IT) Auditing and the mapping of CNSI/NSTISSI standards with ISACA IT Auditing Model Curriculum, have assisted the public and private organizations for business systems and information technologies to be protected and controlled.

Each institution has different needs, resources and starting point. Anthony [14] pointed out that the main concern in the higher education is to protect the data, proper use, and the management of data as a business asset. It is organized on different models and goals than the corporate sector, non-profit organizations face similar issues such as risk, liability, business continuity, costs, and national repercussions when core activities were move to the Internet. Implementation of data governance tools and practices give benefits for the public higher education and provide quality of the institutional data, effect of the data governance tools and practices on institutional strategic planning and decision making [15].

Factors affecting governance of data security

There is a need to focus towards the data leakage, information security transformation, compliance

monitoring, cyber risks, cyber threats, disaster recovery, business continuity and prevention from data loss. There are six categories that require attention in the governance of the data security which is the security training, individual values, security policy implementation, beliefs, security culture and internal control assessment [3]. Most of the attacks comes from insider abuse, unauthorized access towards the systems, loss of data through portable devices for instance USB, PDA or phones [12].

Protecting and preserving the confidentiality, integrity, availability of information is the main concern of authenticity and reliability [11]. The occurrence and impact of information security breaches can be decreased through the learning and knowing of the computer security and ethics.

Data are to be protected through processes. The weakest connections towards the information systems are the faculty staffs in the organizations that they are to follow the information security rules and regulations [4]. Securing resources will be difficult if no management support and a security awareness program in the organization is restricted in what it is able to achieve [4]. Absence of information security process during recruitment by the human resource and training that is provided by human resource, variance demands from users, ignorance and attitude from users as well as inconsistently applied policies and procedures creates issues in the organizations when there is no management support [4]. Hence, communication becomes a problem when no proper communication tools and skills are available among the faculty staffs.

III. RESEARCH METHODOLOGY

This paper focuses on the identification of factors affecting governance of data security in higher education. The aim is to identify new data security governance practices were to help to solve data governance problems in the higher education.

The research carried out through quantitative approach in a form of collecting survey data. The data is analyzed by using statistical method. In the research design, qualitative method was used which consists of analytical approach focusing on the review and analysis of the literature review that will help to develop the research

conceptual model. A survey questionnaire is conducted to collect data and statistical tool is used to analyze the data. The research is based on the 8 hypotheses feedbacks and comments on the survey instrument. The data are collected from various faculties' staffs in a higher education institution. Then, the data is analyzed and to enhance the findings in the research. Furthermore, a qualitative approach is used for the data security governance model.

IV. FINDINGS AND DISCUSSION

This paper has been based on research conceptual model. Different governance data security models were proposed by various experts for different categories.

V. DATA SECURITY GOVERNANCE MODEL OF HIGHER EDUCATION

Figure 1 illustrates the governance of data security conceptual model for higher education.

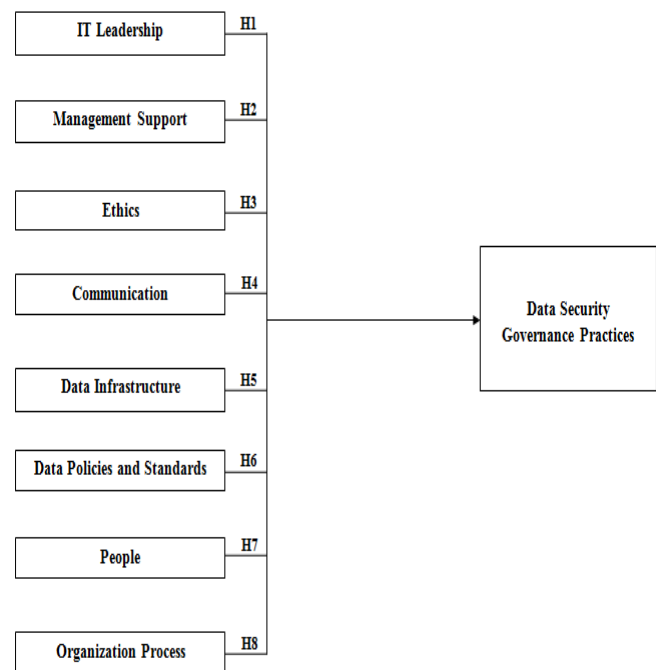


Figure 1: Governance of data security Model

$$r = \frac{n(\sum xy) - (\sum x)(\sum y)}{\sqrt{[n\sum x^2 - (\sum x)^2][n\sum y^2 - (\sum y)^2]}}$$

Figure 2: pearson correlation formula

Pearson correlation is applied to identify the links between the variables. The objective of this research is to identify these factors that influence the data security governance practices in the higher education. It is to measure the linear correlation between two variables X and Y. The values of the Pearson Correlation range from -1 to +1 with negative numbers representing a negative correlation and positive numbers representing a positive correlation .The closer the value is to -1 or +1, the stronger the association is between the variables.

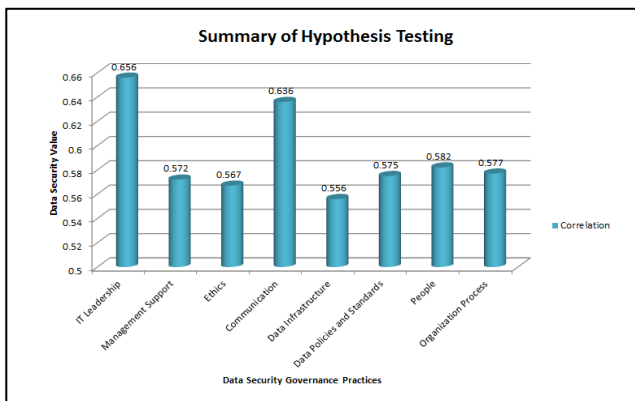


Figure 3: summary of hypothesis testing

$$Y = a + bX$$

$$a = \frac{(\sum y)(\sum x^2) - (\sum x)(\sum xy)}{n(\sum x^2) - (\sum x)^2}$$

$$b = \frac{n(\sum xy) - (\sum x)(\sum y)}{n(\sum x^2) - (\sum x)^2}$$

Figure 4: Regression analysis formula

X is the independent variable and Y is the dependent variable. The slope of the line is b, and a is the intercept (the value of y when x = 0).

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	32.397	8	4.050	13.780	.000 ^b
	Residual	31.152	106	.294		
	Total	63.550	114			

a. Dependent Variable: Data Security Governance Practices_Mean
 b. Predictors: (Constant), Organization Process_Mean, Data Policies and Standard_Mean, Management Support_Mean, Ethics_Mean, People_Mean, IT Leadership_Mean, Data Infrastructure_Mean, Communications_Mean

Table 1: anova (Stastical significance)

The F-ratio in the ANOVA table tests whether the overall regression is a good fit for the data. Table 1 shows that the independent variables statistically significantly predict the dependent variable, $F(8, 106)=13.780, p<0.0005$ which indicates that the regression model is a good fit of the data.

Model Summary				
Model	R	R Square	Adjustable R Square	Std. Error of the Estimate
1	.714 ^a	.510	.473	.54212

Predictors: (Constant), Organization Process, Data Policies and Standards, Management Support, Ethics, People, IT Leadership, Data Infrastructure, Communication

Table 2: model summary of regression analysis

The result generated from regression analysis is beneficial to show the impact of independent variables (IT Leadership, Management Support, Ethics, Communication, Data Infrastructure, Data Policies and Standards, People, Organization Process) in explaining the variation of the dependent variable (Data Security Governance Practices). Table 2 shows that the value of R Square is 0.510, which means the eight independent variables are able to explain 51% of the variation in the dependent variables.

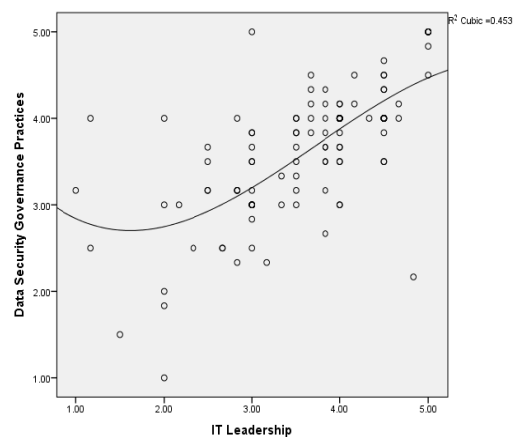


Figure 5: scatter dot graph

High positive correlation when the values increase together. 1 is a perfect positive correlation. 0 is no correlation and -1 is a perfect negative correlation. The Figure 5 shows that the values are more than 1 which indicate IT Leadership have positive relationship with Data Security Governance Practices.

VI. LIMITATION AND FUTUREWORK

There are some limitations that need to be taken into considerations through this research study. The respondents of this study are from various faculty staffs in the higher education. Their opinions may slightly differ among all the faculty members based on their exposure towards the governance of data security and expertise. This paper is adopting the quantitative approach using questionnaire to collect data. However, the difficulties to collect information from faculty staffs who are not aware on the importance of the governance in the data security may contribute to biasness in the results. Nevertheless, security measures in data management are indeed prioritized in the higher education. Future research is to empirically test the data security governance factors in confirming that these factors actually support the higher education's practices in data security governance.

VII. CONCLUSION

This paper analyzes the governance of data security conceptual model for higher education in Malaysia. Based on the quantitative and qualitative survey, it was discovered that all the factors have positive relationship with the data security governance practices. As per summary of hypothesis, IT leadership is most influential factor that IT experts are expected to take lead control and organize the technologies in the higher education institution to have better data security governance in higher education. Research findings shows that the governance model of data security should include IT leadership, management support, ethics, communication, data infrastructure, data policies and standards, people and organization process.

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