

Exploring Data Risk and Information Technology Governance in the Cloud Computing Environment for Taiwan's Banking Industry

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ABSTRACT

Although cloud computing services are the future trends for many industries that is highly taken for granted, however, in recent, the growing events of data leakage and information security in the banking industry have forced banks and other industries to carefully evaluate data risk and information technology (IT) governance while adopting any cloud-computing services. From literature review, prior studies put very limited accent on data risk management and IT governance in Clouding Computing environment for the banking industry. Therefore, exploring data risk management and IT governance in Clouding Computing environment have hold the spotlight of the government, industry and academia. So, this study aims to explore these two issues. The research findings revealed that information regulations compliance, data risk awareness and information skills of bank's employees are positively related to the information security maturity of banks. The seniority and age of bank's employees are significant mediators for the relationship between data risk and information security maturity in the cloud computing environment. Gender of bank's employees is not a significant mediator.

Keywords: Cloud Computing, data Risk Management, Information Governance maturity, Information Governance

INTRODUCTION

Cloud computing services are the future trends for many industries that is highly taken for granted. However, the cloud computing and services are more complex than traditional database and network communication environment, so the challenges of data risk and information governance are greater than ever. Thus, Zhang (2010) pointed out that before introducing cloud computing services, firms should assess the possible trade-off and security risks that may occur. Especially, in recent, the growing events of data leakage and information security in the banking industry have forced banks and other industries to carefully evaluate data risk and information technology (IT) governance while adopting any cloud-computing services. Once information security has not safely guarded, it will be a big trouble for all banks. It will not only affect the customer personal information property, but also may cause turbulent

for overall financial status of a country. Therefore, exploring data risk management and IT governance in clouding computing environment have hold the spotlight of the government, industry and academia. Banks deal with titanic transactions which include confidentially personal data. Banks and their employees are expected to have high information security maturity (ISM) and awareness, respectively. However, from literature review, prior studies put very limited accent on data risk management and IT governance in Clouding Computing environment for the banking industry. Therefore, this study aims to explore data risk and information technology governance in the cloud computing environment for Taiwan's banking industry.

RESEARCH FRAMEWORK AND HYPOTHESE DEVELOPMENT

This study selects Taiwan's banks as research targets to explore factors affecting information governance maturity in the cloud computing environment, and to set gender, age and seniority as moderators. Based on the results of literature review, the research framework is illustrated as figure 1.

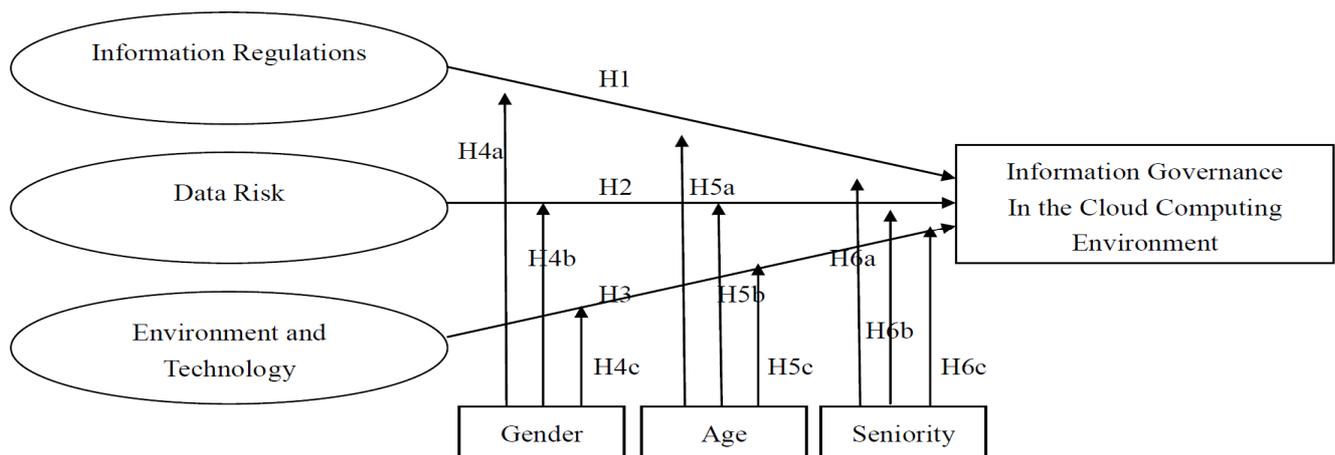


Figure 1: The research framework of this study

Lee (2012) indicated that the awareness of information regulations of organization employees is positively related to the ISM of an organization. Kao (2012) also figured out that an organization with high ISM will achieve high information regulation compliance (IRC) of employees. So, this study derives the following hypotheses.

H1: Information regulation compliance is related to information security maturity.

Lee (2012) also indicated that an organization with high data risk will result in many information security events like information leakage, hacker attack or computer virus infection which hint the ISM of a firm is low. Williams (2001) also pointed out a firm should meet the average level of ISM, otherwise it will incur high data risk. So, this study derives the following hypotheses.

H2: Data Risk is related to information security maturity.

Goodman (2009) argued that different cloud computing environments like public cloud or private should need different ISM to meet their security requirement. Roger (2010) also mentioned that a firm needs different ISM to meet the information security requirement while the version of cloud operating systems are updated. So, this study derives the following hypotheses.

H3: Technology environment is related to information security maturity.

Referring to UTAUT (Unified Theory of Acceptance and Use of Technology) (Venkatesh, Morris and Davis, 2003), this study sets gender, age and seniority as moderators. So the following series hypotheses are induced:

H4a/b/c: Gender has moderating effect on the relationship between ISM and IRC/Data Risk/Technology environment.

H5a/b/c: Age has moderating effect on the relationship between ISM and IRC/Data Risk/Technology environment.

H6a/b/c: Seniority has moderating effect on the relationship between ISM and IRC/Data Risk/Technology environment.

QUESTIONNAIRE DESIGN AND DATA COLLECTION

The questionnaire used by this study is composed of three parts which are mainly modified from questionnaires developed by Cloud Security Alliance (CSA) (2010), Huang (2013) and Wu (2006). The first part evaluates data risk. The second part evaluates ISM. The third part is basic profile of respondents. All question items in the first two parts are measured on a seven-point Likert-type scale, ranging from “strongly disagree” to “strongly agree”.

Every questionnaire items are reviewed by 12 experts and screened by content validity ratio (CVR) (Lawshe, 1975). The question item which fails to pass the threshold value of CVR (CVR=0.56) will be deleted. The questionnaire content required qualified respondents with knowledge of IT, understanding the operations of banks.

The sampling targets are Taiwan's bank employees. A total of 250 questionnaires were issued out on March 15, 2014. By April 15, 2014, 234 questionnaires had been received and verified as valid, yielding a valid response rate of 93.6% after discarding incomplete ones.

DATA ANALYSIS

This study applied descriptive statistics, cronbach's α , Average Variance Extracted(AVE), Composite Reliability(CR) and path analysis of SEM (Structure Equation Modeling) to analyze data. The threshold value of cronbach's α , CR and AVE are set as 0.7 (Guieford, 1965), 0.6 (Hair, Joseph and Barry, 2006) and 0.5 (Fornell and Larcker, 1981), respectively. Both cronbach's α and CR values of each construct is

greater than 0.7. It hints high internal consistency is achieved. The results of descriptive statistics and AVE analysis are tabulated in table 1 and 2, respectively. From table 2, all AVE values are greater than 0.6. It hints that this study has good convergent validity.

Table 1: The results of descriptive statistics

item	item	number	Percentage (%)
Gender	male	125	53.4
	female	109	46.6
Age	20↓	23	9.8
	21~30	71	40.2
	31~40	87	34.6
	41↑	53	15.4
Seniority	5↓	21	8.9
	5~10	68	29.2
	11~15	86	36.7
	16~20↑	59	25.2

Table 2: The results of AVE Analysis

Construct	Indicators	Factor loading	AVE
Information Regulations	IR1	0.872	0.738
	IR2	0.914	
	IR3	0.904	
	IR4	0.830	
	IR5	0.767	
Data Risks	DR1	0.830	0.686
	DR2	0.808	
	DR3	0.821	
	DR4	0.847	
	DR5	0.833	
	DR6	0.838	
	DR7	0.822	
Environment and Technology	ET1	0.841	0.698
	ET2	0.862	
	ET3	0.821	
	ET4	0.813	
	ET5	0.838	

After verifying the reliability and validity, this study applies SEM to construct the research model. The results of model fitness analysis is listed in table 3. From table 3, all criteria of the model fitness are met.

Table 3: The results of model fitness analysis

Goodness of fit indices	Indicators	Standard	Value	Test results
Absolute Fit Measures	χ^2/df	less than 3	1.860	Support
	GFI	over than 0.9 0.9 to 0.8 is acceptable	0.900	Support
	AGFI	over than 0.9 0.9 to 0.8 is acceptable	0.857	Support
	RMSEA	less than 0.08	0.061	Support
Incremental Fit Measures	NFI	greater than 0.9	0.950	Support
	TLI	greater than 0.9	0.969	Support
	CFI	greater than 0.9	0.976	Support
	IFI	greater than 0.9	0.976	Support
Parsimonious Fit Measures	PNFI	greater than 0.5	0.745	Support
	PCFI	greater than 0.5	0.766	Support

Then, this study employs path analysis to test all hypotheses. The results of path analysis show that three paths are significant. The results of the first three hypotheses are summarized in table 4. The results of moderating effect hypotheses are listed in table 5 to 7.

Table 4: The results of the first three hypotheses

Hypothesis	Path	Standardized Regression Weights	Standard error	t-value	p-value	results
H1	Information Regulations -> Information governance maturity	0.149	0.080	2.387	0.017	Support
H2	Data risks-> Information governance maturity	0.418	0.107	5.007	***	Support
H3	Environment and Technology -> Information governance maturity	0.416	0.113	4.714	***	Support

* P < 0.05 , ** P < 0.01 , *** P < 0.001

Table 5: The results of moderating effect hypotheses for gender

Hypothesis	Not limited model	Limited model	$\Delta\chi^2$	Test results
gender-> information regulations	389.076 (DF=240)	389.087 (DF=241)	0.011	not support
gender -> data risks	389.076 (DF=240)	391.202 (DF=241)	2.126	not support
gender -> environment and technology	389.076 (DF=240)	390.501 (DF=241)	1.425	not support

** p < 0.05

Table 6: The results of moderating effect hypotheses for age

Hypothesis	Not limited model	Limited model	$\Delta\chi^2$	Test results
age-> information regulations	802.657 (DF=480)	805.332 (DF=483)	2.675	not support
age -> data risks	802.657 (DF=480)	818.993 (DF=483)	16.336	support
age -> environment and technology	802.657 (DF=480)	812.346 (DF=483)	9.689	support

** p < 0.05

Table 7: The results of moderating effect hypotheses for seniority

Hypothesis	Not limited model	Limited model	$\Delta\chi^2$	Test results
seniority-> information regulations	774.327 (DF=480)	780.369 (DF=483)	4.747	not support
seniority -> data risks	774.327 (DF=480)	791.032 (DF=483)	16.705	support
seniority -> environment and technology	774.327 (DF=480)	788.005 (DF=483)	13.728	support

** p < 0.05

RESEARCH FINDINGS AND CONCLUSIONS

From table 4, this study finds that IRC, data risk awareness and information skills of bank's employees are positively related to the information security maturity of banks. So banks have to evaluate their ISM and to provide more employee training on IRC, data risk awareness and information skills before introducing cloud computing service in order to gain the benefit of cloud computing service like efficiency and convenience.

The seniority and age of bank's employees are significant mediators for the relationship between data risk and information security maturity in the cloud computing environment. Gender of bank's employees is not a significant mediator. Because banks have to obey the information security-related regulation or law promulgated by the government such as Personal Data Protection Act or Privacy Law, the ISM of banks and information security awareness are much higher than other industries. So all moderators of this study is insignificant for the path between IRC and ISM.

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