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Information System Structure and the Demand for Monitoring Costs

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ABSTRACT

It is claimed that information system structure can affect the coordination, monitoring and controlling of organisational activities, and in turn reduce the costs involved. This paper aims to investigate how the information system structure of an organisation affects its demand and preference for monitoring costs in Malaysian business environment. About 867 questionnaires were distributed to public listed companies in Malaysia, however, only 235 questionnaires were completed and usable for the purpose of the study. Descriptive statistics and regression analysis were carried out to analyze the data. The findings indicate that companies using centralised information system structure have negative and significant relationship with total monitoring costs, this result may be explained by the fact that the agents' self interest behaviour can be monitored by the centralised system. However the information system structure is not significant when the cost of directorship and auditing are compared. But when internal auditing and external auditing costs are compared, the result indicates that companies with centralised information system structure have significantly more internal auditing costs. This paper contributes to the literature relating to the relationship between information system structures and monitoring costs, especially in Malaysian business settings.

Keywords: Information system structure, monitoring, auditing, internal audit, external audit, directorship, agency theory

INTRODUCTION

Global competition requires organisation to replace top-heavy management structures with lean, energetic and flexible organisation, and adopt an information system which can play a major role in this competitive environment (Vincent, 1990).

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It is also claimed that agents' self interest behaviour can be monitored through information system, where organisation can invest in information system in order to control agent opportunism (Eisenhardt, 1989).

Porter & Miller (1985) claim that having an effective information system structure is a key mean to attain substantial and sustainable advantage within the competitive market place. In order to avoid causing organisational friction, an organisation should structure its organisational context in an appropriate manner. Questions arise as to what information system has to do with governance. Karake (1992) highlights that the major issue is how best to use information system for coordination, monitoring and controlling of the organisations activities in order to reduce cost. The demand for information that is timely, relevant, accurate, reliable and transparent is very crucial for the board to make sound decisions, set and execute strategies and oversee business performance. Agency theory also regards information as a commodity, where it can be purchased (Eisenhardt, 1989). It is claimed that the organisation can invest in information system in order to enhance accountability and control agent opportunism (Luo, 2005) as the information system inform the principals about what the agents are doing, therefore they cannot be deceived (Eisenhardt, 1989). This is supported by Ekanayake (2004) who claims that an inability to have complete governance procedures such as management control system as a mechanism to limit the opportunistic behaviour of agents can give rise to a lot of agency problems.

Previous studies examine various dimension of information structure in relation to other factors, such as how information system improve competitive advantage (Porter & Miller, 1985; Vincent, 1990), organisational consideration of information system (King, 1983), and information technology performance (Karake, 1995). There are also studies examining the information system structure and corporate governance (Karake, 1992; Luo, 2005), but none of the studies investigate how information system influence the components of the monitoring /agency costs of an organization, and the preference between the components.

This study attempts to examine how the information system of an organisation affects the component of its monitoring/agency costs in Malaysian organizations. This study uses the direct measure of agency costs, which are the cost of monitoring the companies as recommended by Malaysian Code of Corporate Governance (FCCG, 2001), namely the cost of directorship, internal audit and external audit. Specifically, this study focuses on how the information system affects the demand and preferences of these three monitoring mechanisms as the proxy for agency costs in Malaysian organizations.

This paper proceeds as follows: Section 2 gives a review of the relevant literature and proceeds with the development of hypotheses, and Section 3 provides a description of the methodology used for this study. Section 4 presents and discusses the results of the empirical analysis, and finally the last section concludes the study.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Information system encompasses of information that business creates and uses as well as the technology to process the information (Porter & Millar, 1985). Different organisations subscribe for various information system structures, ranging from highly centralised to highly decentralised (Karake, 1992). Centralised information structure is said to save money, involve uniform operation, and promote cost cutting and economics of scale (Vonsimson, 1990; King, 1983). Centralisation allows close monitoring and adjustment of work activities to better correspond with overall organisational operation (King, 1983). On the other hand, decentralisation can create problems if the decisions of the sub-departments are not in line with the overall objectives of the organisation at large and therefore more monitoring is needed. Thus, it is argued that an organisation with centralised information system structure can be better monitored, the activities can be tuned to suit the overall objectives of the organisation, less conflict and information asymmetries (as the information system is centralised), and less monitoring is needed. Consequently, it is hypothesised that:

> H_1: *An organisation which has a centralised information system structure has a lower total amount expended on monitoring from auditing and directorship*.

Decentralisation of information system allows lower level managers discretion in choosing among options (King, 1983) and due to self interest motives exist in the organisation, it can create problems if the decisions of the sub-departments are not in line with the overall objectives of the organisation at large. This structure may provide obstacle for directors in obtaining information regarding the organisation as a whole, compared to centralised structures which allow directors to get timely, relevant, accurate, reliable and transparent information (Karake, 1992). A centralised structure is also said to promote efficiency (King, 1983). In other words, a centralised structure facilitates the directors' job to make sound decisions, set objectives, execute strategies and oversee business performance. It is argued that organisations with centralised information structure motivate the organisations to depend more on directors compared to the auditors as their monitoring mechanism because with the information supplied by the centralised information system, the

board can monitor the organisations efficiently, and less reliance on auditors. Hence, it is hypothesised that:

> H_2: *An organisation which has a centralised information system structure has a relatively greater expenditure on monitoring from directors compared to auditing (internal and external).*

In the event that auditing is used as a monitoring mechanism in an organisation with centralised information structure, the internal control and the accounting technologies of the systems are important and more relied upon by claimholders. The value of external auditors' independence is lower here as the internal auditors are perceived as being able to understand and more familiar with the information system, its technologies and complexities better than the external auditors (Anderson *et al*., 1993). Furthermore, if the internal audit is carried out internally, they are the staff of the organisation and more familiar with its systems. Even though the service is outsourced, it is among the internal auditors' responsibilities to review and ensure that all the internal control systems, including the information system and policies of the organisation are being carried out in order to achieve the objectives of the organisation. In other words, the internal auditors' responsibilities in an organisation (regardless of whether it is in-house or outsourced) make them more familiar with the policies and systems that the organisation has compared to the external auditors. In fact, Anderson *et al*. (1993) claim that in this circumstance, external auditors can also rely on internal accounting control (including internal auditors) in conducting the external audit and produce cost savings to the organisation. Therefore it is argued that the organisation would depend more on the internal auditors rather than external auditors. Hence it is hypothesised that:

> H_3: *An organisation which has a centralised information system structure has a relatively greater expenditure on monitoring from internal auditing compared to external auditing.*

METHODOLOGY

Data and Sample

Data for the study was collected using primary source. Questionnaires were distributed to all 867 companies (from Main and Second board as at 31 December 2007) in the population. However, the companies classified under finance sector were excluded in this study because of their unique features and business activities, as well as differences in compliance and regulatory requirements (Yatim *et al*., 2006)**.** The response rate was 27%, with 235 usable samples used in the study.

Models and Variable Definition

There are three models to test the three hypotheses. And there are three dependent variables, one dependent variable for each model.

The first model tests hypothesis 1 (H_1):

$$\begin{aligned} \text{MONITORING} = {} & \alpha_i + b_1\text{ISStruc} + b_2\text{SIZE} + b_3\text{REVIND} + b_4\text{COMPLEX} \\ & + b_5\text{GROWTH} + b_6\text{CONTRASE} + b_7\text{INDPROP} \\ & + b_8\text{RISK} + b_9\text{LISTSTAT} + \varepsilon_i \quad \textit{Model 1} \end{aligned}$$

Where the dependent variable is the monitoring costs of the companies listed in Bursa Malaysia. Directorship and auditing (internal and external) are specified as monitoring mechanisms in the Malaysian Code of Corporate Governance (FCCG, 2001). This total Monitoring (MONITORING) is measured by the sum of organization investment in non-executive directors' remunerations, internal auditors' costs, and external auditors' costs.

The second model test hypothesis 2 (H_2):

$$\begin{aligned} \text{DIRAUD} = {} & \alpha_i + b_1\ \text{ISStruc} + b_2\text{SIZE} + b_3\text{REVIND} + b_4\text{COMPLEX} \\ & + b_5\text{GROWTH} + b_6\text{CONTRASE} + b_7\text{INDPROP} + b_8\text{RISK} \\ & + b_9\text{LISTSTAT} + \varepsilon_i \quad \textit{Model 2} \end{aligned}$$

Where the dependent variable is the ratio of total directors' remuneration to total auditing. This model test the hypothesis relating to the preference between directorship and auditing.

The third model test hypothesis 3 (H_3):

$$\begin{aligned} \text{INT EXT} = {} & \alpha_i + b_1\ \text{ISStruc} + b_2\text{SIZE} + b_3\text{REVIND} + b_4\text{COMPLEX} \\ & + b_5\text{GROWTH} + b_6\text{CONTRASE} + b_7\text{INDPROP} + b_8\text{RISK} \\ & + b_9\text{LISTSTAT} + \varepsilon_i \quad \textit{Model 3} \end{aligned}$$

Where the dependent variable is the ratio of the total internal audit costs to total external audit costs. This model test the hypothesis relating to the preference between internal auditing and external auditing.

The independent variable in all models is the information system structure (ISStruc) adopted by the companies. The controlled variables included in this study are size, complexity, risk, sectors and listing status.

FINDINGS AND DISCUSSIONS

Descriptive Statistics

Data was cleaned before the analysis was carried out. The data was also checked for reliability and validity. The reliability coefficient (Cronbach Alpha) was within the agreed upon lower limit of 0.8 (Ho, 2006, p. 240). The Cronbach Alpha of 0.828 suggests that the items are reliable and internally consistent to represent the information system attribute of the organizations (ISSTRC). The value of Kaiser-Meyer-Olkin for the data is 0.656 which indicates that the factor analysis model is appropriate as the value is greater than 0.6 (Cyril De Run, 2008, p.76).

The results of non-response bias test indicate that there are no significant differences in the replies between early and late respondents, which act as proxy for respondents and non-respondents. This suggests that non-response bias would not be an issue in this study.

Table 1 Descriptive summary statistics

Variable	Mean	Minimum	Maximum	Std Dev	Skewness	Kurtosis
MONITORING	12.984	10.9491	16.8605	1.0005	0.864	0.922
DIRAUD	9.7291	0.1076	38.2952	7.4972	1.190	1.516
INTEXT	0.5959	0.0000	2.2210	0.4098	1.437	2.777
ISStruc	0.8000	0.0000	1.0000	0.3980	-1.544	0.386
SIZE	19.744	16.720	24.8991	1.4171	0.911	0.887
REVINV	0.3088	0.0019	0.8046	0.1945	0.329	-0.888
COMPLEX	2.4998	0.0000	6.0981	0.9091	0.232	1.430
GROWTH	1.0515	0	1	0.7092	5.424	42.856
CONTRASE	0.3300	0	1	0.4720	0.718	-1.497
INDPROP	0.5400	0	1	0.5000	-0.146	-1.996
RISK	0.2000	0	1	0.3980	1.544	0.386
LISTSTAT	0.7400	0	1	0.4370	-1.130	-0.731

Variable definition:
MONITOR = Total monitoring costs(ln); DIRAUD = Ratio of director costs to auditing costs; INTEXT = Ratio of internal audit costs to external audit costs (ln); ISSTRC = Information structure (Dummy); SIZE = Total assets(ln); RECINV = Ratio of inventories and receivables to total assets; COMPLEX =Number of subsidiaries(ln); GROWTH = Tobin's Q; RISK = Current year loss(Dummy); LISTSTAT = Board listing (Dummy); CONSTRASE = Companies in consumer, trading and service sectors; INDPROP = Companies in industrial, constructions and property sectors.

Table 2 Pearson's correlation

Variable	MONITOR	DIRAUD	AINEXT	ISSTRC	RECINV	RISK	SIZE	COMPLEX	GROWTH	LISTSTAT	CONSTRASE	INDPROP
MONITOR	1.00											
DIRAUD	-0.07	1.00										
AINEXT	0.05	-0.01	1.00									
ISSTRC	-0.085*	-0.017	0.17***	1.00								
RECINV	-0.21***	0.17***	0.01	0.10*	1.00							
RISK	-0.25***	-0.12***	-0.06	0.00	0.00	1.00						
SIZE	0.82***	0.32***	0.21***	-0.08	-0.40***	-0.23***	1.00					
COMPLEX	0.61***	0.22***	0.05	-0.13**	-0.14**	-0.04	0.52***	1.00				
GROWTH	0.09*	-0.05	0.16***	0.07	0.00	0.01	0.05	-0.04	1.00			
LISTSTAT	0.32***	-0.02	0.05	0.01	-0.23***	-0.28***	0.47***	0.21**	0.06	1.00		
CONSTRASE	0.11*	-0.04	0.06	0.05	0.09*	-0.10*	0.02	0.09*	0.04	0.00	1.00	
INDPROP	-0.15**	0.09*	-0.156	0.04	0.09*	0.09*	-0.09*	-0.07	-0.08	-0.09***	-0.76**	1.00

Notes: *** significant at 1% level
** significant at 5% level
* significant at 10% level
(See variable definition in Table 1)

Table 1 presents descriptive statistics of the dependent, independent and control variables. The results of standard tests on skewness and kurtosis in Table 1 indicate that there is no problem with normality assumption[1]. Thus, these variables can reasonably be considered as normally distributed.

Table 2 presents pairwise correlation coefficient of all variables. The result indicates that there is no multicollinearity problem, as the correlations among the independent variables are below the threshold value of 0.8 (Gujarati, 2003, p. 359).

Regression Analysis

The data was analyzed using multiple regression analysis. Table 3 presents the results for all the three models.

Column two of Table 3 presents the multiple regression analysis used to test the model 1. The adjusted R squared for the model is 0.745 and the F-value of 76.853 is significant ($p < 0.000$). The result indicates that those companies having centralised information system have significant negative relationship with monitoring costs as predicted. Thus, hypotheses H_1 is supported. The independent t-test run for this variable against the monitoring costs is also significant (at 10 percent level of significant). This result support the earlier notion that those companies having centralised information system are expected to have lower monitoring costs. This is due to the fact that agents self interest behaviour can be monitored though this information system (Eisenhardt, 1989) which is further argued to be able to better monitor the activities of the organisation and make sure that the activities of the subdivision/subsidiaries are in-lined with the overall objectives of the organisations. This result is consistent with the findings from earlier studies by King (1983) who claim that centralised information system allows close monitoring of activities and better correspond with the organisational overall objectives.

However, information systems structure variable in Model 2 (column three of Table 3) is not significant, thus hypothesis H_2 is not supported. The independent t-tests run for both variables against the ratio of directorship to auditing are also insignificant. In other words, while monitoring is important, the preference between directorship and auditing is less clear. A plausible explanation for this insignificant result may be due to the existence of some control measures in Malaysian listed firms. It is noted that, Malaysian firms have some control measures in their companies regardless of whether they are having a centralised or decentralised information system. Close to 84% of the sample companies have budgets,

[1] The data is said to be normal if the standard skewness is within ±1.96 and standard kurtosis is between ±3.0 (Mat Nor & Sulong, 2007; Abdul Rahman & Mohamed Ali, 2006; Haniffa & Hudaib, 2006).

approximately 70% of the companies prepare variance reports and most of them (90.6%) have management meetings to solve companies' problems. Having internal control measures (87%) and cost accounting measures (75.6%) also appear to be a norm in these companies. Overall, the centralised information system manages to cut costs and promote efficiency in the firms (as shown in the significant result in Model 1), but when directorship and auditing are compared, it is not significant. This may be due to the existences of these controls which also provide information to the top management of the companies in monitoring their companies and can also be used to check on the sales and profit figures of the companies, resulted in this insignificant result.

Table 3 Results of OLS estimation

Variables	Model 1	Model 2	Model 3
CONSTANT	1.822***	47.317***	-1.519***
	(2.979)	(5.601)	(-3.245)
ISStruc	-0.145*	-0.269	0.141**
	(-1.754)	(-0.235)	(2.234)
SIZE	0.538***	-1.938***	0.112***
	(16.383)	(-4.270)	(4.45)
COMPLEX	0.253***	-0.503	-0.089***
	(5.758)	(-0.831)	(-2.643)
RECINV	0.585***	1.427	0.276*
	(3.026)	(0.534)	(1867)
RISK	-0.189**	-3.342***	-0.005
	(-2.121)	(-2.718)	(-0.079)
GROWTH	0.103**	-0.418	0.067*
	(2.197)	(-0.643)	(1.865)
LISTSTAT	-0.207**	2.363**	-0.074
	(-2.358)	(1.945)	(-1.101)
CONTRASE	-0.014	0.600	-0.058
	(-0.121)	(0.387)	(-0.679)
CONSTPROP	-0.148	1.580	-0.121
	(-1.400)	(1.084)	(-1.501)
R-squared	0.755	0.166	0.143
Adj R-squared	0.745	0.133	0.109
F-Statistics	76.853	4.987	4.184
P-value	0.000000	0.000000	0.000000

Notes: *** significant at 1% level; ** significant at 5% level ; * significant at 10% level (See variable definition in Table 1)

Column four of Table 3 presents the result of Model 3. The results in this column indicate that companies with centralised information system would have higher monitoring costs in internal audit compared to external audit. This hypothesis variable is significant and at the expected direction, thus hypothesis H_3 is supported. The independent t-test run for this variable against the ratio of internal audit costs to external audit costs is also significant.

This significant result may be due to the fact that the focus of internal audit works includes dealing with the details and technicalities of information system in the organisation. Section 4.68 of the Code (FCCG, 2001) specifies that the main role of the internal audit function is to evaluate risk and monitor the internal control system, and should be in the position to assist the board in obtaining the assurance relating to the effectiveness of the internal control system. The internal auditors need to understand the established policies, procedures and statutory requirements (including those relating to information system) that the organisation needs to comply with, as among their responsibilities are to ensure that these procedures and policies are complied with, followed by systematic review of the internal control system, accounting and management information system and risk management system (Kah Yun and Haron, 2004). This is supported by Fadzil *et al*. (2005) who claim that internal auditors understand and appreciate the organisation business process, act as management consultant to reduce risks and help run an organisation more efficiently and effectively to increase shareholders' value. In fact, under this circumstance, external auditors can also rely on internal accounting control (including internal auditors) in conducting the external audit and produce cost savings to the organisation (Anderson *et al*., 1993).

CONCLUSION

The major purpose of this study is to investigate how the information system structure of an organisation affects its demand and preference for monitoring costs in Malaysian business environment. The results indicate that companies which has centralised information structure have significantly less monitoring costs compared to those companies adopting decentralised information system. This finding suggests that centralised information system helps the organisation to save money, promote cost cutting and encourage efficiency. However the information system structure is not significant when the cost of directorship and auditing are compared. But when internal auditing and external auditing costs are compared, the result indicates that companies with centralised information structure have significantly more internal auditing costs. This result may be due to the fact that taking care of the organisations' internal control systems, including the information system are within the responsibilities of the internal auditors.

This study has its limitation which should be interpreted in a limited way, and this provides opportunities for further investigation in future research. This study is a cross sectional study, where it uses one year data only. This is due to the unavailability of certain data (such as details on information system adopted by the organizations and their internal audit costs) from secondary sources. This short period of study may not be representative of the way companies operate their businesses. Future research could extend the study to include more years of data, thus further investigation on the impact of the information system structure on the demand and preferences for monitoring mechanisms in the short and long-terms can be analyzed. Future study can also investigate the relationship between monitoring costs and information system structure in Malaysian organizations by using a different research method. Interview sessions can be arranged with those involved in selecting and overseeing of the monitoring mechanisms and those involved in the decision relating to information system structure of the organizations. This study adds to the literature relating to the relationship between information system structures and monitoring costs, especially in Malaysian business settings.

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