THAMMASAT REVIEW
PRINT ISSN: 0859-5747 ONLINE ISSN: 2630-0303
Volume 21 No 1 (January-June) 2018 [Page 1-25]

The Determinant of Enterprise Risk Management Implementation: Evidence in Thailand and Malaysia

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Received 9 March 2018; Received in revised form 27 April 2018
Accepted 2 May 2018; Available online 25 June 2018

Abstract

The implementation of Enterprise Risk Management (ERM) has been seen as a plausible solution to difficulties that arose during the recent global financial crisis. In an increasingly volatile global financial environment, ERM is considered to have a clear advantage over Traditional Risk Management (TRM). While many companies have set up ERM initiatives; they lack a clear understanding of the factors that will lead to successful ERM implementation. There are relatively few studies conducted in this area and especially in developing countries like Thailand and Malaysia. This paper therefore aims to gain insight into the influential factors of ERM implementation in both Thai and Malaysian listed companies. This study is based on surveys of managing directors from public listed firms in the Stock Exchange of Thailand and Malaysia. Based on the data obtained, regression models will be employed to determine the relationship between derived scores and the attributes of the organizations. The empirical results show that different countries have different determinants of ERM. Firm size has a statistically positive relationship with a high level of ERM implementation in both countries. In Thai listed companies, economic factors have a statistically positive relationship with the high level of ERM implementation and lower ERM scores have more revenue volatility than those with well-implement ERM. In addition, big 4 audit firms are associated with the degree of ERM implementation in Malaysian listed companies.

Keywords

Enterprise Risk Management, ERM Implementation, Driver of ERM, Determinant, Firm Specification

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Introduction

A highly volatile global context requires businesses to deal with a wide range of risks that pose imminent threats to their organization. With the financial crisis that started in the United States in 2008 and rapidly spread around the globe, major businesses such as Lehman Brothers failed and other businesses such as Citigroup, AIG and Washington Mutual had severe problems. A number of authors in the media predicted a recession worse than the Great Depression in 1930s. Following a series of scandals and the crisis, there was a demand for stronger regulation of boards of directors to ensure better management of risks to which enterprises are exposed. Poor risk management or traditional risk management was cited as a contributing factor in the aftermath of the Global Crisis (Voinea & Anton, 2009). Enterprise Risk Management (ERM) framework has emerged as an important instrument to help enterprises counter and manage risks, and so ensure long term sustainability of an organization.

ERM was a response to dealing with the risks and uncertainties from internal and external sources that organizations confront. It provides a process-oriented framework following a holistic approach to the risks. The aim of ERM implementation is to increase shareholder value (Hoyt and Liebenberg, 2011; Pagach and Warr, 2010) and enhance value creation (Nocco & Stulz, 2006). This will be achieved through the implementation of risk management which can ensure capital allocation is efficient (Myers & Read, 2001), better risk management decisions are made (Cummins, Phillips, & Smith, 2001), competitive advantage is maintained (Hoyt & Liebenberg, 2011), enhanced corporate governance (Gates, 2006), improving supply chain management (Liang, Wang, & Gao, 2012), with cost efficiency and enhanced business decisions (Grace, Leverty, Phillips, & Shimpi, 2010). ERM initiation requires the board to take charge of the company's risk (Chapman, 2011), with management setting strategies and objectives balanced between return goals, and related risks and resources in pursuit of the company's objectives. Enterprises usually employ ERM as a tool to evaluate their risk attitude, identify and prioritize risks, as well as determine which risks should be accepted, mitigated or avoided. In 2006, The Association of Corporate Treasurers stated that "ERM is no longer a theoretical nicety, ERM has become a practical necessity". ERM is an increasingly popular business strategy that attempts to manage all of the risks faced by a firm. The majority of listed companies in both financial and non-financial sectors have started to implement ERM as a strategic business tool to effectively manage risk within an acceptable level to achieve the company's objectives. Schoening and Wyman (2005) found that more than 90 percent of executives from the US and Canadian boards would like to implement ERM, however, only 11 percent had completely done so based on a 2005 survey. Also, Brown, Pott, and Wömpener (2014) point out that effective internal control and risk management is a main determinant of financial disclosure transparency; however, there

are still questions about what the determinants of effective ERM implementation are. The lack of clear empirical evidence of which firm-specific characteristics influence ERM implementation may inhibit the effectiveness of its implementation. Hence, it is vital to examine which of a firm's characteristics have a significant relationship associated with the implementation of ERM.

In this paper, we will examine the firm-specific characteristics that have a relationship with the success of the firm's ERM implementation based on surveys from Thai and Malaysian listed companies.

Background and Hypotheses

Lack of unifying ERM Framework

There are various frameworks which have been specified by international organizations, such as the COSO ERM framework (COSO), Casualty Actuarial Society (CAS) overview of risk management framework, International Organisation for Standard risk management principles and guidelines (ISO 31000) and Standard & Poor (S&P) ERM. They are related, hence there is the possibility of producing a unifying ERM definition and thus a more comprehensive framework. The COSO ERM framework is the most popular framework being used by many enterprises worldwide (Beasley, Branson, & Hancock, 2010; Beasley, Clune, & Hermanson, 2005; Power, 2007). The definition of the COSO ERM is used as a reference in many ERM academic papers (e.g., Arnold, Walsh, Oldham, & Rapp, 2007; Desender & Lafuente., 2010; Gordon, Loeb, & Tseng, 2009; Lin, Wen, & Yu, 2012; Pagach & Warr, 2010; Tahir & Razali, 2011). The COSO ERM provides an integrated framework which aims to tackle comprehensively the effective management of risk within an organisation with key principles and guidance on how this should be achieved. The COSO ERM comprises of eight vertical components of risk management as one model dimension, a second dimension of four vertical columns covering key types of risk objectives, and a third dimension relating the enterprise unit in the risk framework. Fraser, Schoening Thiessen, Simkins, and Fraser (2008) found that the COSO ERM recommended tools and techniques were not being considered as a key source of guidance for implementing ERM because its model was too general and also very difficult to implement. As for the ISO 31000, Leitch (2010) indicates that "many of the definitions in ISO 31000 are not clear and meaningful, let alone close to the actual usage of the terms." Again, this is unhelpful when implementing ERM. The Casualty Actuarial Society (CAS) suggests that ERM is synonymous with "strategic risk management", "integrated risk management" and "holistic risk management", which they highlight as comprehensive views of risk management that move from the "silo" approach of managing different risks within an organisation. According to CAS (2003), an organisation should include four main types of risk; hazard risks; financial risks, operational risks and strategic

risks, which are different from the COSO ERM framework which has four objectives including strategic, operations, reporting, and compliance.

Standard & Poor (S&P)'s have included an ERM component in their credit rating since 2005 and revised criteria in 2013, starting in the financial services and insurance sectors. In 2008, S&P introduced an ERM rating approach for non-financial companies as part of their corporate credit ratings analysis. S&P did not create a new definition but created four major analytical components as a part of ERM, regardless of the company or sector analyzed. These components include: analysis of risk controls, analysis of risk-management culture and governance, analysis of emerging risk preparation, and analysis of strategic risk management.

Measuring ERM implementation

For the last decade, academic researchers and practitioners have conducted studies into the implementation and characteristics of ERM. The streams of ERM studies can be grouped into four main categories: firstly, those investigating ERM practice and characteristics (e.g., Colquitt, Hoyt, & Lee, 1999; Kleffner, Lee, & McGannon, 2003); secondly, those making an in-depth case study of ERM in each business sector (e.g., Aabo, Fraser, & Simkins, 2005; Acharyya, 2009; Harrington, Barros, Newman, Perez, & Kolodner, 2009; Mikes & Kaplan, 2013; Stroh, 2005); thirdly, those studying the relationship between ERM implementation and value creation (e.g., Eckles, Hoyt, & Miller, 2010; Gordon et al., 2009; Grace et al., 2010; Hoyt & Liebenberg, 2011; McShane, Nair, & Rustambekov, 2011; Pooser, 2012); and lastly, those analyzing implementation of ERM determinants (e.g., Beasley et al., 2005; Golshan & Rasid, 2012; Hoyt & Liebenberg, 2011; Liebenberg & Hoyt, 2003; Pagach & Warr, 2011; Razali, Yazid, & Tahir, 2011).

Recently, many critics have been concerned about the quality of the measurement of ERM implementation which has given rise to the inability to produce a definite understanding of the relationship between ERM and other aspects of the firm such as performance (e.g., Iyer, Rogers, Simkins, & Fraser, 2010; Kraus & Lehner, 2012; Mikes & Kaplan, 2013). This has also had an impact on studies on the determinants of ERM implementation. The most popular methodologies have used ERM proxy such as ERM keyword or CRO keyword rather than attempting to measure implementation directly (e.g., Beasley, Pagach, & Warr, 2008; Eckles et al., 2010; Hoyt & Liebenberg, 2011; Liebenberg & Hoyt, 2003; Pagach & Warr, 2010; Tahir & Razali, 2011). Most of these studies are based on data from U.S. listed companies and used the appointment of a CRO or an addition to ERM keywords such as “enterprise risk management”, “chief risk officer”, “risk committee”, strategic risk management”, “consolidated risk management”, “holistic risk management”, and “integrated risk management” as a proxy for a company’s implementation of ERM.

Some researchers have based ERM measurement on Standard and Poor's ERM ratings (e.g., Lin et al., 2012; McShane et al., 2011; Pooser, 2012). They introduced a criterion for assessing ERM amongst insurers. They expanded and integrated the ERM characteristics into the S&P index for insurance, banking and nonfinancial firms. S&P divided the ERM Quality Scale into four categories; weak, adequate, strong and excellent. From the S&P index classification of ERM, weak and adequate levels can be described as traditional risk management while strong and excellent levels can be described as ERM (McShane et al., 2011).

A few researchers have developed new ERM measurements such as an ERM index which combines other risk measures (e.g., Beasley et al., 2005; Gordon et al., 2009; Grace et al., 2010; Quon, Zeghal, & Maingot, 2012). ERM indices have been formed through ERM specific components. Most of these indices have developed from using accounting calculations from financial data or using secondary data to measure ERM implementation. , for example, attempted to develop an ERM implementation level based on survey data. However, problems arise from using general purpose surveys on emerging issues in internal auditing which cannot gain inside holistically ERM components and besides, internal auditors do not have accurate knowledge of ERM implementation. A failing of these approaches is the lack of observation of internal holistic components of ERM derived from various frameworks.

Recently, Sithipolvanichgul and Ansell (2016) proposed an ERM measurement method by integrating 40 ERM components to gather information on ERM implementation directly from companies based on various ERM definitions and frameworks. The ERM measurement method uses surveys to collect information on ERM practices. Therefore, we use the method to derive the level of ERM implementation.

Determinants of ERM Implementation

Most studies on the determinants of ERM implementation have used ERM proxies rather than attempting to measure implementation directly (e.g., Golshan & Rasid, 2012; Hoyt & Liebenberg, 2011; Liebenberg & Hoyt, 2003; Pagach & Warr, 2011; Razali et al., 2011). Beasley et al. (2005) determined ERM stages by using secondary data obtained from the Institute of Internal Auditors (IIA). Based on previous literature, this study explored the proposed set of characteristics and their relationship to the various stages of ERM implementation. The characteristics that have been previously considered are shown below with their posed relationship to ERM implementation.

Firm Size *(SIZE)*. Larger companies seem to face more uncertainty and complexity in their business operations, and as a result, they need to implement effective risk management systems (Gatzert & Martin, 2015). Previous studies suggest there is a positive correlation between firm size and engagement in ERM activities (Beasley et al., 2005; Hoyt &

Liebenberg, 2011; Pagach & Warr, 2011; Rao, 2018; Razali et al., 2011). In contrast Liebenberg and Hoyt (2003) found size has a negative relationship. We hypothesize that:

H_1: Listed companies with a larger firm size tend to have a higher level of ERM implementation.

Leverage *(LEV)*. Leverage affects the capital structure of a company; excessive debt can increase the chance of bankruptcy, and it might have the potential for financial distress. Hence greater leverage implies a greater default risk (Hoyt & Liebenberg, 2011). Therefore, firms with high leverage should manage risk to an acceptable level in order to avoid debt default and financial difficulty. Leverage may not be related directly to ERM (Hoyt & Liebenberg, 2011), yet financial leverage was found to have a positive effect on the implementation of ERM (e.g., Golshan & Rasid, 2012; Liebenberg & Hoyt, 2003). Therefore, we hypothesize that:

H_2: Listed companies with a higher leverage tend to have a higher level of ERM implementation.

Reputation *(REPUT)*. Firms are more aware of ensuring transparency and good governance to establish their reputation. Reputation is a valuable asset of a company that should be maintained and can be affected by the stakeholders' perception of risk management (Markham, 1972). Therefore, we hypothesize that:

H_3: Listed companies with a higher reputation tend to have a higher level of ERM implementation.

Growth *(Growth)*. According to Pagach and Warr (2011), firms with a higher growth option generally have a higher cost of financing because of the uncertainty of the payoff and higher possibility of bankruptcy. Firms with high growth might face a higher degree of uncertainty due to the pressure to achieve future returns, and hence take risky actions to achieve their business objectives (Liebenberg & Hoyt, 2003). Therefore, we hypothesize that:

H_4: Listed companies with higher growth tend to have a higher level of ERM implementation.

Technology Change *(TECH)*. Rapid development of technology requires effective risk management (Rasmussen, 1997; Raz, Shenhar, & Dvir, 2002) which is critical to successful information technology (IT) protection (Stoneburner, Goguen, & Feringa, 2002). Technology progress contributes to reducing negative risk exposure and unexpected low returns (Kim & Chavas, 2003). Hence we hypothesize that:

H_5: Listed companies with higher technology uncertainty tend to have a higher level of ERM implementation.

Market Uncertainty *(MARKET)*/ Earning Volatility *(INCOME)*. Liebenberg and Hoyt (2003) mention that one of the general benefits of ERM is a reduction in volatility in a company. Uncertainties such as the general environment, industry and firm-specifics may cause unpredictability in a firm's overall performance (Miller, 1992). Both Liebenberg and Hoyt (2003) and Hoyt and Liebenberg (2011) hypothesized the relationship between ERM implementation and the volatility of earnings but both studies show insignificant results. Kren (1992) and Gordon et al. (2009) separated the uncertainty in the organisation into a variation of sales (market uncertainty) and a variation of earnings (earning volatility). Higher market uncertainty and earning volatility might negatively affect ERM implementation. Therefore, we hypothesize that:

H_6: Listed companies with a higher sales uncertainty tend to have a lower level of ERM implementation

H_7: Listed companies with higher earnings volatility tend to have a lower level of ERM implementation

Economic Factor/ Gross Domestic Product by Sector *(ECON)*. Erb, Harvey, and Viskanta (1996) found that economic growth is significantly related to expected returns and the fundamental valuation of the firm. In previous studies, GDP is usually taken as a proxy when performing cross sectional studies. Within a country different sectors can provide sector GPD which might influence growth opportunity within a specific sector. A higher GPD by sector might relate to having a greater need for more effective ERM due to better resources, greater competition and opportunity among these firms.

H_8: Listed companies with a higher GPD by sector tend to have better ERM implementation.

Auditor influence

In the accounting literature, large auditing firms (i.e., the Big Four auditors) provide higher quality (Eshleman & Guo, 2014). This might persuade their clients to have a higher level of ERM implementation. Moreover, it might be the case that organizations committed to engaging such high quality auditors also are more committed to risk management (Beasley et al., 2005). Therefore the presence of a Big Four auditor might be positively associated with a higher level of ERM implementation.

H_9: Engagement of a Big 4 audit firm is positively associated with the degree of ERM implementation.

Data and Methodology

Data

Since the implementation of the ASEAN Exchange in 2012, Singapore, Thailand and Malaysia have joined this electronic platform, connecting Bursa Malaysia, the Singapore Exchange, and the Stock Exchange of Thailand. An exemption from capital gains taxes when shares are bought using the ASEAN Trading link enhances the opportunity of investors to invest in these markets. In this trading platform, emerging countries such as Thailand and Malaysia have significant growth opportunities, with GPD growth around 6%. Singapore, classified as a developing country, has had GPD growth of around 1. 3%. Thailand and Malaysia are at the primary stage in order to understand the determinants of ERM in the South East Asian Listed Companies emerging market.

As publicly-available information could not provide sufficient detail to derive a holistic view of risk management implementation, questionnaires developed by Sithipolvanichgul and Ansell (2016) were distributed to the managing directors in all 451 Thai listed companies in the Stock Exchange of Thailand (SET), and all 818 Malaysia listed companies in Bursa Malaysia. This survey covered all industries and sectors in Thai and Malaysian Public Listed firms. The survey questions were pre-tested with five practitioners on a voluntary basis and adjusted before the final questionnaire was sent out to firms. 164 responses from Thai and Malaysia listed companies were returned - a response rate of around 13%. After deducting missing data, our final sample included 137 responses.

Clearly it was important to test if there was selection bias, and this was done using the Heckman correction method (Heckman, 1976, 1978) by considering both the collected sample (uncensored) and those not included in the sample (censored). The information on the dependent and control variables. The results of the analysis were that ρ (rho) and λ (Lambda) did not significantly differ from zero, with a 5% level of significance. Hence there does not appear to have been any selection bias. The instrument's reliability was assessed using Cronbach's alpha. The resulting alpha value was 0.97 and the test of Cronbach's Alpha if items were deleted was constructed to consider loss in criterion validity. None of the components indicated that their deletion would lead to an increase in the value of Cronbach's alpha; thus the internal consistency of the scale was established. Therefore, the ERM components have a high degree of reliability and construct validity. The survey instrument was appropriate to conduct further analysis.

ERM Score

Following Sithipolvanichgul and Ansell (2016) , we obtained 40 components to describe effective ERM implementation, which can be grouped into 6 categories: 1) fundamental ERM; 2) existence of ERM evidence; 3) risk management structure and architecture; 4) risk management policy and risk appetite; 5) responsibilities and accountability; 6) risk management process including identifying and managing risk, communication, training and knowledge development, technology, and monitoring. Brief summaries of the 6 categories are as follow.

1) Fundamental ERM categories comprises 5 scores including applied risk management to strategic setting process, aligned business risks into its routine corporate process, concern risk oversight with the company's strategy and how the company's perceived the benefit from risk management. All five components are the basic features of the ERM concept.

2) Evidence of ERM existence comprises 14 scores describing formal evidence of ERM implementation and review, such as risk management policy, risk management framework or guidelines, risk appetite, risk tolerances, risk register/risk portfolio, business continuity plan, crisis management, and self-control assessment by boards level and staff level. If an organisation has implemented ERM then there should be observable evidence of these elements. COSO ERM and ISO 31000 recommend reviewing these evidences of ERM periodically in response to situational changes.

3) Risk management structure and architecture comprises 3 scores including the existence of a risk management committee, risk management department and independence of risk management structure, and identifies risk management elements within the structure independent of the risk management structure. The overview of risk management framework issued by CAS mentions these components in its ERM guidelines. Therefore, many academics (e.g. Hoyt & Liebenberg, 2011; Liebenberg & Hoyt, 2003; Pagach & Warr, 2010) use proxies on the existing of risk management structure to present clear signs of ERM implementation.

4) Risk management policy and risk appetite comprises 3 scores. These components include acknowledgment of risk management policy, determining risk appetite and level of risk management applied across the company.

5) Responsibilities and accountability comprises 5 scores. A key feature of ERM is that all members of the company have some responsibility to support the company's risk policy and promote compliance within its risk appetite; the board of directors has the final reponsibility of oversight to ERM and be ownership. It also considers the reporting structure of the company. These components include frequency of board of director's meetings

arranging risk management matters, the independence of the risk management committee, CRO's responsibility and employee's involvement.

The last 10 scores come from the framework of the effective ERM implementation process: identifying and controlling risk, effective communication throughout the firm, having training and development at the managements and staffs level, adequate technology and information systems to support risk management systems and the regular monitoring of risk management.

ERM SCORING can be calculated by summarizing its 40 components[1]. The equally weighted sum is then converted into 5 ERM categories as follows: 1 if ERM score ≤ 8; 2 if 8 < ERM score ≤ 16; 3 if 17 < ERM score ≤ 24; 4 if 25 < ERM score ≤ 32; 5 if 32 < ERM score ≤ 40, from least to most ERM-supportive. The ERM score is presented in table 1.

Table 1 ERM Score Description

ERM Scoring	Raw Score (X)	Assessment	Explanation
1	0 ≤ X ≤ 8	No or weak risk management level	This stage shows the lack of a reliable control system and inadequate risk management system in the firms
2	8 < X ≤ 16	Risk management level	Concerned at the traditional risk management system level: not gathering all risks across the firm and still managing risks in silos
3	16 < X ≤ 24	Starting ERM implement level	Indication of starting ERM implementation in the company but has not reached ERM standard
4	24 < X ≤ 32	ERM standard level	Main components of ERM have been covered in the company
5	32 < X ≤ 40	ERM Effective level	Most components of ERM are included

[1] The underlying variables measurement is available upon request. Please contact authors.

Methodology

To explore the influence of ERM determinants as addressed in our hypotheses, we used the ordinal logistic regression model for the analysis. Figure 1 presents a conceptual model*:* the determinant of ERM implementation.

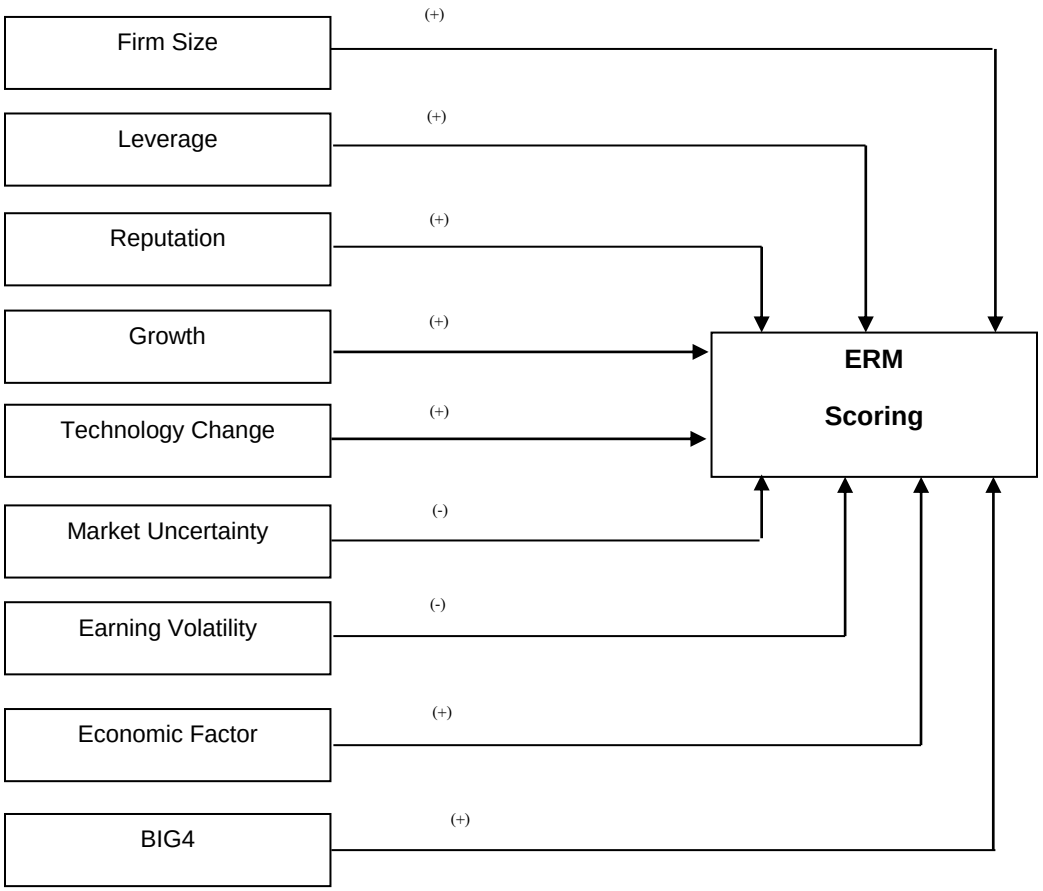

Figure 1 Conceptual Model: the determinant of enterprise risk management implementation.

The empirical model with which we tested our hypothesis is as follows:

ERM SCORING = f (SIZE, LEV, REPUT, GROWTH, TECH, MARKET, INCOME, ECON and BIG4)

where the *ERM* SCORING is measured by data of Thai and Malaysian publicly listed companies based on our sample. Independent variables were obtained from Setsmart

Database[2] and DataStream database. The definition and expected signs are shown in Table 2.

Table 2 Variable Measures

Variable Name	Expected Sign	Definition	Data source
ERM implement stage *(ERM Scoring)*		Our proposed ERM score for each company	Survey Collection
Firm Size *(SIZE)*	+	Log (book value of asset)	Setsmart Database and DataStream (WC02999)
Leverage *(LEV)*	+	Leverage (Total liabilities divided by the market value of equity)	Setsmart Database and DataStream (WC03999) and (MV)
REPUTATION *(REPUT)*	+	Number of years since incorporation for firm *i*	DataStream (WC18272)
GROWTH *(GROWTH)*	+	(Sales $_{t}$ - Sales $_{t-1}$)/ Sales $_{t-1}$	Setsmart Database and DataStream (WC01001)
Technology Change *(TECH)*	+	Coefficient of variation of the sum of capital Expenditures (5 years)	COV (sum of 5 year DataStream (WC04601)
Market Uncertainty *(MARKET)*	-	Coefficient of variation of sales (5 years)	COV (sum of 5 year DataStream (WC01001)
Earning Volatility *(INCOME)*	-	Coefficient of variation of net income before taxes (5 years)	COV (sum of 5 year DataStream (WC01401)
Economic Factor *(ECON)*	+	Percentage change of Domestic Production by sector	Bank of Thailand and Department of Statistics, Malaysia
BIG4 *(BIG4)*	+	One if the company has use independent BIG 4 auditor firms on that year, and zero otherwise.	Annual Report

Note: ERM = enterprise risk management. This table provides the definition and the expected sign for each variable.

[2] SETSMART database is an information database system developed by the Stock Exchange of Thailand. The service is a comprehensive source of information which integrates real-time information, historical trading prices and indices, listed companies information and news, and key statistics information.

Empirical Results

Descriptive Statistics

Table 3 shows descriptive statistics on the variables used in the regression model which include the mean value and standard deviation of each ERM scoring category. The relationship between the level of ERM implementation and the determinant variables are in line with our expectation. Based on the sample, 62 percent of the sample (N=85) categorized according to ERM levels (ERM score 4 and 5), while 38 percent (N=52) of listed companies in our sample were at the risk management to start implementing the ERM level (ERM score 1 to 3). When Thai and Malaysian Listed companies were compared, there were significant differences between the level of ERM implementation and countries with a likelihood ratio statistic of 10.855 and with a p-value of (2-sided) equal .028. Based on ERM implementation level (ERM score 4 and 5), 64 percent of Malaysian listed companies implemented ERM which is higher than Thai listed companies (61 percent). Twenty percent (N=28) of Thai listed companies are in ERM score 1 to 2, while only 10 percent (N= 5) of Malaysian Listed companies are.

Table 3 Descriptive Statistics Categorized by ERM scoring

	1 (N=13)		2 (N=15)		3 (N=24)		4 (N=44)		5 (N=41)	
Variable	***MEAN***	***SD.***	***MEAN***	***SD.***	***MEAN***	***SD.***	***MEAN***	***SD.***	***MEAN***	***SD.***
ERM scoring (All Sample)										
Size	6.3	0.49	6.57	0.72	6.12	0.75	6.67	0.92	7.42	1.05
LEV	1.28	1.84	0.86	0.99	0.43	0.66	0.89	1.21	1.98	3.46
REPUT	25	14.91	26.2	13.23	21.71	10.54	20.66	16.33	26.61	22.56
GROWTH	-0.13	0.3	0.08	0.28	0.11	0.32	0.42	1.58	0.17	0.44
TECH	0.77	0.38	0.61	0.36	0.7	0.37	0.62	0.37	0.49	0.28
MARKET	0.27	0.18	0.27	0.22	0.25	0.18	0.24	0.21	0.2	0.19
INCOME	1.68	1.71	0.1	2.12	0.28	2.6	0.86	3.54	1.36	5.11
ECON	0.5	1.77	1.49	2.63	3.02	3.19	3.61	5.49	2.08	3.8
BIG4	0.46	0.52	0.67	0.49	0.42	0.5	0.68	0.47	0.88	0.33
ERM scoring (Thai Listed Companies)										
Size	6.36	0.46	6.79	0.59	6.40	0.46	7.12	0.79	7.69	1.00
LEV	1.38	1.89	1.17	0.99	0.88	0.76	1.44	1.37	2.85	3.91
REPUT	25.58	15.41	29.45	13.56	24.45	14.20	23.92	20.14	31.43	25.24
GROWTH	-0.15	0.31	0.09	0.33	0.20	0.41	0.20	0.20	0.10	0.21
TECH	0.75	0.39	0.57	0.36	0.66	0.34	0.61	0.42	0.51	0.26
MARKET	0.27	0.19	0.24	0.19	0.27	0.18	0.23	0.22	0.16	0.09
INCOME	1.76	1.76	0.51	1.68	-0.11	3.40	1.65	4.20	2.06	5.85
ECON	0.01	0.03	0.01	0.04	0.00	0.04	0.03	0.04	0.04	0.05
BIG4	0.50	0.52	0.73	0.47	0.36	0.50	0.68	0.48	0.39	0.39
ERM scoring (Malaysian Listed Companies)										
Size	5.58	-	5.95	0.73	5.88	0.88	6.09	0.73	6.83	0.94
LEV	0.12	-	0.02	0.02	0.05	0.09	0.16	0.16	0.09	0.09
REPUT	18.00	-	17.25	7.63	19.38	5.68	16.37	7.85	16.23	9.61
GROWTH	25.74	-	2.05	2.26	9.26	15.59	6.01	5.65	3.06	3.92
TECH	1.07	-	0.73	0.38	0.73	0.4	0.62	0.31	0.45	0.33
MARKET	0.31	-	0.34	0.32	0.23	0.18	0.26	0.20	0.29	0.30
INCOME	0.73	-	-1.01	3.06	0.61	1.75	-0.17	2.09	-0.16	2.55
ECON	6.40	-	5.55	1.50	5.57	2.02	8.32	5.55	6.48	4.18
BIG4	0.00	-	0.50	0.58	0.46	0.52	0.68	0.48	1.00	0.00

Note: This table provides the mean value for our variable for all samples in each ERM scoring category. All variable definition are provided in Table 1 and Table 2

Table 4 shows the Pearson correlation coefficient. The signs of the correlation of the determinant ERM variables are as expected. There is no correlation above 0.5 between independent variables. Co-linearity is not a problem in our regression model.

Results

An ordinal logistic regression model was used to investigate the relationship between firm-specific characteristics and ERM implementation. Table 5 shows the regression results. Table 5 Panel A, based on all samples, shows ERM determinant variables in our model are significantly related to different ERM scoring with model Chi-square = 43.21 and P-value of .000, with a Pseudo R-square of 28.50% . The independent variable results show that many factors are related to ERM implementation. The higher level of ERM scoring is positively related to firm size *(SIZE)* with p-value of 0.000, so larger firms are associated with better ERM implementation. This finding suggests that larger firms tend to implement ERM because of a readiness in resources and a willingness to organize the extent of the risk management system. Moreover, we found economic factors, or GDP by sector *(ECON),* are also associated with the extent of ERM implementation, with P-value 0. 055. Firms that operate in high GDP industries are more likely to develop better ERM implementation and to have a more effective risk management system due to industry regulations, the complexity of each sector and the industry's opportunity and growth.

Table 5 Panel B, based on Thai listed companies, shows ERM determinant variables in our model are significantly related to different ERM scoring with model Chi-square = 42.407 and P-value of .000 with a Pseudo R-square of 40.50%. The higher level of ERM scoring is positively related to firm size *(SIZE)* with p-value of 0.000. Economic factors, or GDP by sector *(ECON),* are associated with the extent of ERM implementation in Thai listed companies with P-value 0.031. In addition, there are significant negative relationships between market uncertainty *(MARKET)* and the level of the effective risk management system, with p-value 0. 007. Therefore, firm size *(SIZE)* , economic factors *(ECON)* , and market uncertainty *(MARKET)* are the determinants of ERM implementation in Thai listed companies.

In Panel C the determinants of ERM in Malaysian listed companies is shown. ERM determinant variables in our model are significantly related to different ERM scoring with model Chi-square = 23. 46 and P-value of . 005, with a Pseudo R-square of 40. 20%. In Malaysian listed companies, firm size *(SIZE)* is positively related to the higher level of ERM implementation with p-value of 0.03. We also found that engagement of a Big 4 audit firm *(BIG4)* is positively associated with the degree of ERM implementation, with p-value 0.011. As a result, firm size *(SIZE)* and the engagement of a big 4 audit firm *(BIG4)* are associated with the degree of ERM implementation in Malaysian listed companies.

It can be concluded that firm size *(SIZE)* is an influential factor of the ERM stage of implementation in both Thai and Malaysian listed companies. Economic factors *(ECON)* and market uncertainty *(MARKET)* are factors of the ERM stage of implementation in Thai listed

companies, while, big 4 audit firms *(BIG4) are* associated with the degree of ERM implementation in Malaysian listed c

Table 4 Pearson Correlation Coefficients Correlations

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Total Sample											
(1)	*ERM Scoring*	1									
(2)	*Size*	.380**	1								
(3)	*LEV*	0.146	.459**	1							
(4)	*REPUT*	0.013	.347**	.220**	1						
(5)	*GROWTH*	0.108	-0.049	-0.014	-0.021	1					
(6)	*TECH*	-.221**	-.365**	-0.117	-0.093	0.127	1				
(7)	*MARKET*	-0.114	-0.079	-0.058	-0.095	.377**	.345**	1			
(8)	*INCOME*	0.042	0.137	.403**	0.081	-0.016	-0.003	-0.11	1		
(9)	*ECON*	0.11	-.328**	-.284**	-.224**	.286**	0.033	0.091	-0.155	1	
(10)	*BIG4*	.280**	.338**	0.004	0.07	-0.107	-.199*	-0.049	-0.026	0.038	1
Thai Listed Companies											
(1)	*ERM Scoring*	1									
(2)	*Size*	.504**	1								
(3)	*LEV*	.218*	0.033	1							
(4)	*REPUT*	0.067	.314**	-0.163	1						
(5)	*GROWTH*	.241*	-0.159	0.018	0.184	1					
(6)	*TECH*	-0.184	-.376**	0.022	-0.16	-0.176	1				
(7)	*MARKET*	-0.201	-0.018	-0.041	-0.052	-0.029	.371**	1			
(8)	*INCOME*	0.082	0.09	-0.015	0.056	-0.101	-0.028	-0.146	1		
(9)	*ECON*	.271*	.243*	0.026	0.113	-0.015	-0.025	0.12	0.149	1	
(10)	*BIG4*	.214*	.342**	0.009	0.079	-0.056	-0.095	-0.017	-0.041	0.001	1

(Continued)

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Malaysian Listed Companies											
(1)	*ERM Scoring*	1									
(2)	*Size*	.378**	1								
(3)	*LEV*	0.199	.282*	1							
(4)	*REPUT*	-0.117	.315*	0.049	1						
(5)	*GROWTH*	0.099	-0.063	.454**	-0.079	1					
(6)	*TECH*	-.339*	-.443**	-0.015	0.155	0.265	1				
(7)	*MARKET*	0.003	-0.098	0.078	-.281*	.533**	.302*	1			
(8)	*INCOME*	-0.039	-0.002	-0.168	-0.195	0.099	0.096	0.067	1		
(9)	*ECON*	0.115	0.005	.295*	-0.004	.310*	0.015	0.007	-0.035	1	
(10)	*BIG4*	.456**	.447**	0.093	0.094	-0.17	-.383**	-0.097	0.029	0.073	1

Table 5 Ordinal logistic regression results

			Panel A All Listed Companies				Panel B Thai Listed Companies				Panel C Malaysian Listed Companies			
Variable		**Expected Sign**	**Co efficient**	**Std. Error**	**Wald's test**	**P-Value**	**Co efficient**	**Std. Error**	**Wald's test**	**P-Value**	**Co efficient**	**Std. Error**	**Wald's test**	**P-Value**
Threshold	ERM SCORING = 1.00		3.595	1.577	5.195	.023	7.083	2.220	10.182	.001	.539	2.894	.035	.852
	= 2.00		4.566	1.577	8.387	.004	8.083	2.242	12.999	.000	2.356	2.758	.729	.393
	= 3.00		5.609	1.594	12.380	.000	8.890	2.270	15.340	.000	4.402	2.769	2.527	.112
	= 4.00		7.346	1.650	19.832	.000	10.629	2.357	20.333	.000	6.785	2.882	5.541	.019
Variable	*Size*	+	.924	.238	15.070	0.000***	1.368	.340	16.189	0.000***	1.055	.479	4.861	0.03**
	LEV	+	.067	.101	.434	.510	.000	.120	.000	.997	-2.151	2.902	.550	.458
	REPUT	+	-.013	.010	1.750	.186	-.009	.011	.725	.394	-.106	.051	4.353	.037
	GROWTH	+	.239	.200	1.424	.233	1.005	.745	1.818	.177	.470	.276	2.900	0.089*
	TECH	+	-.073	.513	.020	.887	.878	.673	1.702	.192	-.149	1.072	.019	.889
	MARKET	-	-1.453	.930	2.444	.118	-3.677	1.357	7.346	0.007***	-1.635	1.718	.906	.341
	INCOME	-	.002	.050	.001	.974	-.006	.060	.009	.924	-.166	.144	1.327	.249
	ECON	+	.087	.045	3.671	0.055*	10.228	4.744	4.649	0.031**	-.007	.070	.011	.918
	BIG4	+	.608	.373	2.652	.103	.184	.480	.147	.701	1.844	.721	6.547	0.011**
	N		137				87				50			
	Pseudo R square		28.50%				40.50%				40.20%			
	Sig		0.000				0.005				0.000			

Impact of Other Variables

We explored other results which were significant in reflecting the ERM implement level. We considered separately the factors of the industry's effect by using the four-digit Standard Industrial Classification (SIC[3]) code in which the company operates in this study (McShane et al., 2011).The second measure of the industry's effect used was the market share of the company over its sector. None of these variables were significant.

Conclusion

In recent years, many companies have attempted to develop and implement ERM to ensure their survival in an increasingly volatile business world. The results thus far have been disappointing, with more than half the companies still settling in the infancy process of ERM implementation. Previous studies have tended to use a proxy; Standard and Poor's ERM ratings, an ERM index which combines other risk measures or uses secondary data for the degree of ERM capability and ERM implementation. These proxies may lead to an ineffective measurement of ERM implementation. Therefore, we used an *ERM scoring* methodology which integrates holistically ERM features. The ERM Score was then empirically surveyed and tested with the Thai and Malaysian listed companies. We found that there are significantly different levels of ERM implementation between Thai listed companies and Malaysian listed companies. Malaysian listed companies tended to have higher ERM levels than Thai listed companies.

Using *ERM Scoring* as a measurement, we were able to explore the determinants of effective ERM implementation through our empirical research. The result confirmed that firm size seemed to determine successful ERM implementation in both countries. A larger firm size related to better ERM implementation, which is consistent with many researchers, such as Hoyt and Liebenberg (2011), Razali et al. (2011) and Pagach and Warr (2011). However, the different countries seem to have different determinants of ERM. In Thai listed companies higher GPD by sector was also associated with the extent of the risk management system. Thai listed companies which operated a higher GPD by sector tended to have better ERM implementation in order to mitigate the risks in Thailand, while big 4 audit firms are associated with the degree of ERM implementation in Malaysian listed companies. The reason for big 4 audit firm influence on ERM adoption is that the big 4 have a better reputation to maintain and might recommend their clients to implement ERM.

[3] SIC codes are assigned based on common characteristics shared in the products, services, production and delivery system of a business.

Research in the ERM domain is still in its infancy, and as credit rating agencies expand ERM ratings which they will apply to both financial and non-financial companies, so the pressure for ERM implementation will become more intense. Different countries have different influence factors to implement ERM. This study provides important insights about making decisions for implementing better ERM that companies should consider both internally and externally. At the same time, this study contributes significantly to regulatory affairs in developing countries who endorse corporate governance practices. Although we highlighted organizational characteristics associated with ERM implementation, there is a limitation in this study due to the specific-countries studied and there may be other important specific-firm characteristics of ERM implementation that have not been reflected in our study.

Further research should expand this study to consider a wider range of countries. From the above limitation, our findings show a preliminary result in increasing our knowledge as to why firms have different success rates in the level of ERM implementation, and they are also important from a regulatory viewpoint to enhance public policy for having better ERM mechanisms in place.

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