Governance and Sustainability of Global Business Economics

Global Conference on Business and Economics Research (GCBER) 2017
14-15 August 2017, Universiti Putra Malaysia, Malaysia

# Using the PLS Modelling in Assessing the Effects of Corporate Governance on Enterprise Risk Management and Firm Value: Malaysian Evidence

Enny Nurdin Sutan Maruhun[*], Wan Razazila Wan Abdullah, Masetah Ahmad Tarmizi

*Universiti Teknologi MARA, Cawangan Perak, Kampus Tapah, Perak, Malaysia*

## Abstract

The governance of companies has been the subject of increasing interest following the 2008 global financial crisis. Enterprise risk management (ERM) was introduced as a response to an increasing pressure received by organizations to manage risks comprehensively and to enhance the firm value that was diminishing during the crisis. ERM is an evolving risk management technique and by using this new tool, a company is able to have an overall view of the potential events that may affect the achievement of its objectives. Despite the claim that ERM is the solution for corporate governance deficiency, particularly in risk management practices and its potential of value creation, the number of empirical research studying this new field is still limited. To date, scarce empirical research has been conducted to examine the current extent of ERM implementation, identify determinants of ERM and assess the association between ERM and firm value. Thus, this study aimed at assessing the current development of ERM practices among Malaysian public-listed companies (PLCs), identifying corporate governance characteristics that influence the implementation and examining the association of corporate governance and ERM with firm value. The implementation of ERM was measured by using ERM Dimension index (ERMDi). ERMDi was developed because of the limitation possessed by ERM dimension which was highlighted in the literatures. A questionnaire survey was developed based on ERMDi to gather information on the current stage of ERM practices. Four corporate governance characteristics were examined that are risk management committee (RMC), board size, proportion of non-executive directors and board expertise. A total of 81 usable questionnaires were successfully collected using the online questionnaire service. The data was analyzed by using Partial Least Squares and Structural Equation Modelling Tool (Smart-PLS 3.0). Based on the analysis, board size and board expertise are the significant determinants of ERM implementation. This study, find support that corporate governance has a positive and significant association with ERM however there is no evidence of significant association between ERM and firm value. Findings from this study enable organisations to understand corporate governance characteristics that influence ERM implementation and its effect towards firm value.

**Keywords:** Corporate governance, enterprise risk management, partial least squares, structural equation modelling

## 1. INTRODUCTION

The 2008 global financial crisis has intensified and refocused interest on risk and the environment of systems that operate to manage those risks. Risk is an event that managers need to face in order to gain profit and avoiding risk means giving up the opportunity to gain profit. The concept of "no risk, no return" is widely accepted in the business world and therefore, it is important for organizations to achieve optimum balance between risk and return (Lam, 2014). Therefore, manager needs to manage factors that stimulate risk so that they can pursue strategic

---
[*]Corresponding author. Tel.: +6-005-4067000; Fax: +6-005-4067712
E-mail: ennyn786@perak.uitm.edu.my

advantage and opportunity arise from the risks (Miccolis & Shah, 2000). Corporate risk management is a vital activity to ensure business sustainability which in the era of globalization, organizations have to encounter a myriad of risks that sometimes is beyond their control. Therefore, an effective risk management system is imperative for organization to be successful and sustained in today's challenging business world.

The financial crisis has increased the pressure on the board of directors and top management in improving corporate governance practices such as enhancing effectiveness of internal control systems particularly emphasizing on the importance of risk management to achieve effective governance and control (Desender, 2007; Sutton, 2006). Many critics blamed weak corporate governance as one of the factors that causes major failure in risk management and as a contributing factor to the collapse of many major corporations in the fiasco. The impact of the crisis had been the "wake-up call" for most corporations when they were unprepared and surprised by the extensions of the crisis (Harner, 2010). Therefore, recuperating from the effects of corporate debacles, policymakers and stakeholders are demanding greater oversight from organizations especially from the board of directors (BODs) and top management in managing key risks that are facing the business. Senior managers need to take more responsibility in managing corporate risks.

Active involvement of the BODs and top management in managing corporate risks is important to ensure that the shareholders' value that is diminishing during the crisis is preserved and enhanced because one of the well stated goal of the board's is to maximize the firm's value (Blanchard & Dionne, 2003). Maximising shareholder value has become entrenched as a principle of corporate governance that was started with corporations based in the United States and Britain and nowadays, the ideology has been followed by corporations around the globe (Lazonick & Sullivan, 2000). In restoring the firm value that is diminishing during the crisis, Enterprise Risk Management (ERM) has gained substantial momentum as a potentially effective response to the risk management challenges. ERM has been proposed as a new mechanism in predicting risks and helping organizations achieve their goals (Arena, Arnaboldi, & Azzone, 2011). ERM is viewed as a management process that requires a firm to identify and assess a portfolio of risks that affects firm value. This new technique manages risks through an enterprise wide strategy, top-down approach and most importantly, it is driven by the need for companies to manage risks effectively in order to sustain operations and achieve business objectives (Frigo & Anderson, 2011; Kleffner, Lee, & McGannon, 2003; Meulbroek, 2002).

Despite the claim that ERM is the solution for corporate governance deficiency particularly in risk management practices and its potential of value creation, the number of empirical research studying this new field is still limited. Empirical research describing the current practices of ERM, factors that influence the ERM implementation and its association with firm value is still lacking (Kleffner et al., 2003; Liebenberg & Hoyt, 2003). Pagach & Warr (2011) argue that little effort has been put in investigating firm's characteristics that influence the firm's decision in implementing ERM. In addition, Beasley, Clune, & Hermanson (2005) highlight that academics need to provide insights into firm's characteristics that influence some organizations to response to the changing risk profiles by embracing ERM while others are not. Thus, the current study has three main objectives; first research objective (RO1) which is to assess the current development of ERM practices among Malaysian public-listed companies (PLCs), second research objective (RO2) which is to identify corporate governance characteristics that influence ERM implementation and the third research objective (RO3) which is to examine the association between corporate governance, ERM and firm value.

The review of literature has identified that the difficulty in measuring ERM implementation and lack of a suitable and an effective dimension to measure ERM construct is the main obstacle to research on this issue (Beasley, Pagach, & Warr, 2008; Gordon, Loeb, & Tseng, 2009; Liebenberg & Hoyt, 2003; McShane, Nair, & Rustambekov, 2011). Thus, the extent of ERM implementation was measured by using Enterprise Risk Management Dimension Index (ERMDi) and ERM dimensions developed in this study. The questionnaire survey was adopted to assess the ERM implementation using ERMDi. In addition, four corporate governance characteristics that are risk management committee (RMC), board size, proportion of non-executive directors and board expertise were analyzed to identify the corporate governance characteristics that influence the ERM practices.

The data obtained was analyzed by using the Partial Least Squares Structural Equation Modeling method (PLS-SEM), Smart-PLS 3.0 software was later used to further analyze the data. PLS-SEM has gained increasing popularity as an effective analytic tool in various business disciplines, but relatively little attention has been given to PLS-SEM in the accounting field since the acceptance rate is rather low. This conclusion was made based on the evidence gathered from a review of the accounting literature conducted by Lee, Petter, Fayard, and Robinson (2011) that found 20 studies in a subset of accounting journals that used PLS as the data analysis tool. As such, this study wants to fill the methodology gap by using PLS-SEM as data analysis tool in testing the hypotheses.

Using data of 81 firms that implementing ERM, we find that board size and RMC are the significant determinants of corporate governance that influence ERM implementation among Malaysian PLCs. Empirical results show that corporate governance is positively and significantly related to ERM. However, we find no significant association between ERM and firm value. Overall, results of this study, demonstrate that corporate governance is an important determinants of ERM but failed to support the hypothesis that firms which practice ERM would have a higher firm value. Therefore, further study is called in this area looking from other perspectives such as another theory for instance shareholders value maximisation that may give an impact towards ERM practices and firm values.

## 2. LITERATURE REVIEWS
### 2.1 Corporate Governance and Risk Management

An increasing trend of high profile corporate failures has led to the debate concerning the effectiveness of corporate governance function in helping organizations to survive a myriad of risks that they are facing. The investors' weakening confidence towards firm's risk reporting has made corporate governance a top priority for the boards of directors, management, auditors, and stakeholders (Sobel & Reding, 2004). The rising expectations from the stakeholders have put pressure on corporations to assess the quality of their corporate governance and the overall response to business risk (Tonello, 2007). Due to this development, the awareness on risk is growing and organizational practices have increasingly become organized around risk.

The theoretical foundation governing corporate governance is agency theory proposed by Jensen and Meckling, (1976) that describe a firm as "a nexus of contracting relationships" between one agent (the CEO) and multiple principals (shareholders, creditors, employees, clients) and refer to the corporate governance problem as a "common agency problem" that involves the contracting parties. To reduce corporate governance problems a firm needs to implement an effective corporate governance mechanism. The main objective of having corporate governance mechanism is to ensure that managers will strive to achieve outcomes that are in the shareholders' interests (Shleifer & Vishny, 1997). These mechanisms help to reduce agency problem and bring the interests of the managers in line with the shareholders. Other mechanisms that can alleviate corporate governance problem is an efficient risk management system (Walsh & Seward, 1990).

Corporate governance and risk management are linked together to assist how organizations can better understand the risks, improve and deliver its objectives and mitigate, assess, and manage risk in an appropriate manner (Zahiruddin & Norlida, 2013). Risk management is a key component of corporate governance. It is an important mechanism in achieving organization's objectives and monitoring agent performance (Demidenko & McNutt, 2010). Therefore, ERM is an important mechanism in the firm governance framework which can be used as a monitoring or controlling mechanism in aligning the principal-agent relationship to reduce agency problem.

### 2.2 Issues on ERM Dimension

Past empirical researches have yielded inconclusive findings regarding the value creation potential of ERM. Lundqvist (2014) argues that the main cause of the mixed findings is partly due to flaws and inconsistencies in the method used to measure the ERM construct. The lack of a suitable and comprehensive dimension available to measure ERM construct is one of the obstacles in researching in this area (Beasley et al., 2008; Gordon et al., 2009; Liebenberg & Hoyt, 2003; McShane et al., 2011; Pagach & Warr, 2010). Inconclusive findings in ERM research are mainly due to different dimension used in measuring ERM and therefore, it is important to have a robust measurement that can measure ERM construct comprehensively. Companies rarely publish comprehensive information about their current risk management practices (Gatzert & Martin, 2015). Firms generally, do not disclose the information on their risk management practices to the public due to the sensitivity and competitive value of the information.

Firms only disclose minimal information on risk management and mainly focus on the discussion as it relates to specific risks. Under these circumstances, it is difficult for researchers to assess the level of ERM implementation by evaluating companies' reports. As a result, many of the empirical studies have only used the appointment of a Chief Risk Officer (CRO) as a signal of ERM adoption (see, e.g., Golshan, Zaleha, & Rasid, 2012; Liebenberg & Hoyt, 2003; Pagach & Warr, 2011). However, CRO appointment as a dimension of ERM has received many criticisms from scholars and the main detraction and key limitation of this proxy is that it fails to measure comprehensively the extent to which a firm actually embraces ERM. Using a simple proxy such as a CRO appointment is problematic since hiring a CRO is not a true and robust measurement that accurately represents a well-implemented and effective ERM system. Therefore, this study proposed a comprehensive and efficient measurement of ERM, which is named as Enterprise Risk Management Dimension Index (ERMDi).

## 3.    HYPOTHESES DEVELOPMENT
### 3.1    Theoretical Framework

Figure 1 illustrates the theoretical framework of this research.  The theoretical framework is developed based on the agency theory as one of the main theories that relates to corporate governance practices and encourages ERM implementation (Fama & Jensen, 1983; Jensen & Meckling, 1976; Subramaniam, 2006).

### 3.2    Corporate Governance Characteristics

RO2 of this study aims to determine corporate governance characteristics that can influence firm's decision to implement ERM.  Thus, from thorough review of past literatures four corporate governance characteristics specifically board characteristics, which are board expertise, board size, proportion of non-executive directors (NEDs) and Risk Management Committee (RMC) are examined as the possible determinant of ERM implementation.

Board size is claimed as one of the corporate governance characteristics that influences the relationship between the level of ERM implementation and firm value.  Larger board size is believed to enhance the institutional and governance functions of the board.  It is argued that expanding the size of the board increases expertise and resources in the organization.  Non-executive directors (NEDs) are independent directors and their main responsibility is to monitor the actions of the CEO and executive directors and to ensure that they pursue the shareholders' interests (Weir & Laing, 2006).
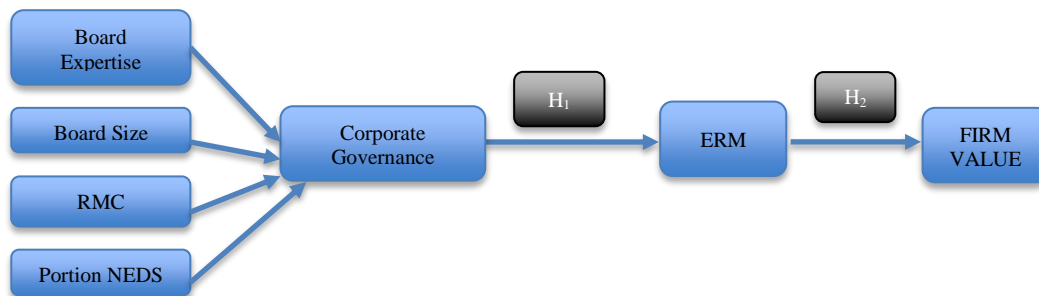


Figure 1: Theoretical Framework

Risk Management Committee (RMC) is a board level committee that is set up to take the responsibility as risk management oversight in an organization (Brown, Steen, & Foreman, 2009).  RMC plays a key role in developing firm's ERM, cultivating a risk culture such as evaluating risk associated with corporate strategies, defining risk appetite of the company, and ensuring that appropriate resources are devoted to risk identification, avoidance, and mitigation (Harner, 2010; Yatim, 2010).  It is argued that the boards that establish a risk management committee demonstrate their commitment to strengthen corporate governance and internal control environment of their firms.

Furthermore, board expertise is claimed to be a determinant of ERM.  One key factor that enables outside directors to reduce agency costs is their expertise.  Due to the outsider expertise, a board could perform its duty more effectively if the majority of board members were outsiders (Huang, Hsu, Khan, & Yu, 2008).  Board of directors with specific expertise such as in accounting or finance would have the skills to identify, analyze and communicate management information for planning, controlling, measuring performance and making decisions and should, therefore, be able to help in developing the techniques for ERM implementation (Siti Zaleha, Abdul Rahim, & Wan Khairuzzaman, 2011).

### 3.3    Corporate Governance and ERM

Agency theory is the theory underpinning the relationship between corporate governance, ERM and value creation. In general, agency theory aligns the relationship between the agent and the principal because in the modern corporation, in which share ownership is widely held, managerial actions depart from those required to maximize the shareholders' returns (Donaldson & Davis, 1991).  Agency theory specifies mechanisms which reduce agency loss (Eisenhardt, 1989).  These include incentive schemes for managers, which reward them financially for maximizing shareholder interests.  To mitigate agency problem, Subramaniam (2006) states that the principal needs to take several strategies that involve either monitoring the agent's behaviour or providing incentives that align the agent's behaviour with the principal's interests.  These strategies are important because according to Jensen and

Meckling (1976), managers will not act to maximize the returns to the shareholders unless appropriate governance structures are implemented to safeguard the interests of shareholders.

Donaldson and Davis (1991) argue that a major structural mechanism to curtail managerial "opportunism" is the corporate function, which is the board of directors. The board of directors is usually considered as one of the most important mechanisms that provides a monitoring of managerial actions on behalf of the shareholders. The principal role of a board of directors is to represent the interests of the firm's stockholders and the board's goal is to maximize the firm's value (Blanchard & Dionne, 2003). Since the corporate scandals and the creation of new corporate governance codes, ERM has been considered as a valuable element of the corporate governance structure (Desender, 2007). Corporate governance and ERM are two interrelated and interdependent components in an organization. The stability and the improvements of the company's performance are highly depended on the effective roles of both components (Norlida, Isahak, & Mohd Rasid, 2010). Bowling and Rieger (2005) argue that ERM could provide a solid foundation upon which firms can enhance corporate governance and deliver greater shareholder value. Thus, ERM has been seen as one of the monitoring or controlling mechanism that can be used to align the principal-agent relationship in achieving the firm's objectives and performance. Consequently, the following hypothesis is posited:

$H_1$: There is a significant positive relationship between corporate governance and the extent of ERM implementation.

### 3.4 ERM and Value Creation

Beasley et al. (2008) assert that albeit the significant rise in the number of organizations implementing ERM, little is understood about the relation between ERM and value creation. The main goal of ERM is to create value, which will essentially increase the firm and shareholder value. ERM increases the firm value by reducing inefficiencies inherent from the traditional risk management (TRM) practices, improving capital efficiency, stabilizing earnings and reducing costs of capital for external funding (Liebenberg & Hoyt, 2003). Nowadays, corporations have realized that risks are no longer merely hazards to be avoided but, in many cases, opportunities to be embraced. It is argued that risks create opportunities and opportunities create value, which ultimately creates shareholders' wealth. However, the most important matter is how to manage risks in order to derive the value (KPMG LLP, 2001).

The paradigm shift in risk management practices has resulted in the progress of ERM which as a result has shown evidence in the shift of focus on risk management research. Nowadays, scholars are concentrating on examining the holistic risk management practices, as well as ERM and its value creating capability. Gordon et al. (2009) argue that the relation between ERM and firm performance is contingent upon the appropriate match between ERM and the specific factors affecting a firm that are environmental uncertainty, industry competition, firm size, firm complexity, and board of directors' monitoring. Hoyt and Liebenberg (2011) examined the extent of ERM practices and value implications of the program among insurer companies. Using Tobin's Q as a proxy of firm value, they have found a positive association between firm value and the use of ERM. Meanwhile, Pagach & Warr, (2010) studied the effect of ERM adoption on firms' long-term performance. The findings show that some firms that are adopting ERM experienced a reduction in earnings volatility. However, in general the study failed to find support for the notion that ERM is value creating. Izah and Ahmad Rizal (2011) are amongst the pioneer researchers who have assessed ERM practices in the Malaysian scenario. This paper estimated the relation between ERM and firm value of 528 of Malaysian public listed companies. Empirically, this study does not find support for the hypothesis that firms practicing ERM have a higher value than firms that do not. The findings from previous studies have led to the following hypothesis:

$H_2$: There is a significant positive relationship between the extent of ERM implementation and firm value.

## 4. RESEARCH METHODOLOGY

To achieve the first research objective (RO1) of this study, which is to assess the extent of ERM implementation, a survey methodology was adopted. Previous literatures have shown that survey is the common method used in assessing ERM practices. The questionnaire was designed with the focus of identifying the level of ERM implementation in a firm. The survey questions were constructed according to Enterprise Risk Management Dimension Index (ERMDi) proposed and developed in this study because of the ERM measurement issues highlighted in the literatures.

## 4.1 ERMDi Development Process

ERMDi is proposed as an instrument that can measure ERM implementation comprehensively. The instrument development process in this study followed a step-by-step guidelines recommended by Mackenzie, Podsakoff, & Podsakoff (2011) and Lewis, Templeton, & Byrd, (2005). Lewis et al., 2005 argue that an instrument development is a critical process particularly in a new research area where the existence of validated instruments is limited. The instrument development process began with an extensive literature review, followed by content adequacy assessments to ensure that a valid and reliable instrument items are produced. The process started with a clear theoretical specification of the ERM construct which included defining the construct, and specifying its premise (purpose) and theoretical domain, as well as the dimensions.

Four critical processes were undertaken to develop ERMDi that are; Stage 1: Conceptualization of the Construct; Stage 2: Development of Measures; Stage 3: Model Specification; and Stage 4: Pilot Test. The propose dimension was operationalized by incorporating the important elements and effectiveness of risk management practices as specified in literatures, specifically in COSO's ERM-Integrated Framework and ISO 31000:2009. ERMDi consists of eight principal dimensions that are measured through 44 items deemed important and relevant in assessing the extent of ERM implementation. The eight interrelated dimensions of ERM are namely, (i) internal environment, (ii) objective setting, (iii) event identification, (iv) risk assessment, (v) risk response, (vi) control activities, (vii) information and communication, and (viii) monitoring. A total of 41 indicators that measuring eight principal components of ERM shows a satisfactory result of reliability and validity thus all of the indicators are remained and used in the final data collection process.

## 4.2 Sample

The sample used for testing the hypotheses consists of Malaysian public listed companies in 2012. The population of this research is limited to publicly traded companies because they are typically large companies that have large operations and are more likely to implement ERM programmes. This study's population was chosen following the suggestion by Beasley et al., (2005) that state that the size of the company is associated with the extent of ERM adoption because, given the resources required to embark on an ERM journey, publicly traded organizations are more likely to make this investment. Samples were selected from the population using simple random sampling method and the final sample comprises of 201 Malaysian PLCs companies from seven industries.

## 4.3 Data Collection

This study employed two types of data, which are primary data; collected through survey questionnaire and secondary data that is obtained from company's annual reports. Primary data was obtained through survey questionnaire that the main objective is to assess the extent of ERM implementation among Malaysian PLCs. On the other hand, secondary data was used to operationalize the variables that are RMC, proportion of non-executive directors, board size, board expertise and firm value. The secondary data was handpicked from companies' published annual reports. A structured questionnaire was administered through '*Survey Monkey*'™, a web-based survey software package. The questionnaire required the respondents to rate the extent of ERM implementation in their organizations based on ERMDi. The survey was sent to personnel responsible for risk management activities in the organization that are chief risk officer (CRO), accountant, management accountant, and internal audit officers. At the end of the data collection period one hundred and five responses were received. However, twenty-four were rejected and removed from the sample because the respondents left a substantial number of questions unanswered. Therefore, the final usable sample consists of eighty one respondents.

## 5. RESULTS AND DISCUSSION

This study examines; (i) the current ERM practices, (ii) corporate governance characteristics that influence ERM implementation and (iii) the link between ERM and firm value in Malaysian PLCs. In order to answer the stated research objectives, data gathered through survey questionnaire and secondary data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM). This study used PLS-SEM as a tool of analyzing data because of; (i) non-normal data, results of normality test suggesting the violation of normality assumption, (ii) small sample size, PLS-SEM works efficiently when small samples are used to estimate path models comprising many constructs, hence, final data consists of 81 companies and, (iii) scale of measurement, PLS-SEM has received considerable support as the recommended method for estimating both formative and reflective constructs.

### 5.1 Analysis on the Extent of ERM Implementation

The extent of ERM implementation was measured by descriptive statistics (means and standard deviations) computed based on the data collected from the questionnaire by using seven-point Likert scale of 1=strongly disagree to 7=strongly agree. To determine the extent of ERM implementation among the Malaysian PLCs, the respondents are rated into three categories that are (i) high extent of ERM implementation, (ii) moderate extent of ERM implementation, and (iii) low extent of ERM implementation. The respondents are classified using semantic scale which is consistent with the scale used in Altemeyer (2004) that measures ERM implementation among the agencies in Texas. The respondents that have the mean scores ranging between 6 and 7 are categorized as high extent, the scale ranging from 4 to 5 is categorized as moderate extent and the scale ranging from 1 to 3 is categorized as low extent of ERM implementation.

Table 1 summarizes the result of frequencies analysis of the extent of ERM implementation among the companies. From the total of 81 companies, 21 companies (26%) are considered as having a high extent of ERM implementation, while the majority of the companies, 58 companies (72%) fall under the category of moderate extent and 2% of the companies were at the low extent of ERM implementation.

Table 1. Extent of ERM implementation among companies

| No | Extent of ERM | Scale | Frequency | % |
|----|---------------|-------|-----------|-----|
| 1. | High Extent | 6 – 7 | 21 | 26 |
| 2. | Moderate Extent | 4 – 5 | 58 | 72 |
| 3. | Low Extent | <4.0 | 2 | 2 |
| | | Total | 81 | 100 |

Table 2 demonstrates the statistical distribution of the scores of the extent of ERM implementation for the whole sample. The mean scores represent the average of the scores of the whole sample (81 participants) on every scale in the questionnaire. The results show that the mean score of the extent of ERM implementation for the total sample is 5.64.

Table 2. Descriptive statistics of the extent of ERM implementation as a whole sample

| Variables | Min | Max | Mean | S.D |
|-----------|-----|-----|------|-----|
| ERM Implementation | 2.77 | 6.72 | 5.64 | .63 |

These findings show a positive movement of ERM practices among Malaysian companies where the current level of ERM implementation is at a moderate level. These findings show that there is a progress in ERM implementation since in previous study examining ERM practices in Malaysian PLCs showed that the level of ERM was still at an early stage. The current movement in ERM implementation among Malaysian PLCs is consistent with other countries with evidence showing that a large number of companies have now started to use ERM as a strategic management tool (Pagach & Warr, 2010). The increasing trend in the usage of ERM among Malaysian PLCs indicates that ERM has gained more attention among Malaysian companies and among the reasons for the positive trend is the amendment of Malaysian Code on Corporate Governance (MCCG) in 2012. The latest revision of MCCG emphasized on risk management practices by the corporations. Among the important principles listed out in MCCG (2012) was Principle 6: Recognize and manage risks which stated that the board should establish a sound framework to manage risks.

### 5.2 Model Estimation Using PLS-SEM

PLS-SEM analysis was conducted to achieve RO2; identify corporate governance characteristics that influence ERM implementation and RO3; examine whether ERM creates value to Malaysian PLCs. PLS-SEM is a component-based estimation method. PLS-SEM path models are formally defined by two sets of linear equations: (i) the measurement model (outer model) and (ii) the structural model (inner model). The measurement model specifies the relations between a construct and its observed indicators also known as manifest variables, whereas the structural model specifies the relationships between the constructs (Jörg Henseler, Hubona, & Ash, 2016). PLS-SEM model estimation procedures are empirical measures of the relationship between the indicators and the constructs (measurement model) as well as between the constructs (structural model).

### 5.3 Assessment of the Measurement Model

Prior to structural model examinations that test the hypotheses of this study, it was also important to ensure the reliability and validity of the measurement model (outer model). This assessment established whether the instrument items that were used to gather the data actually measured what they were intended to measure. ERM

construct and corporate governance are reflectively measured constructs. The reflectively measured constructs assume that the indicators are caused by the underlying construct and therefore, need to be evaluated with regards to its reliability and validity. The first inspection of the reflective measurement model was the assessment of the composite reliability and convergent validity of the constructs. The composite reliability assesses the construct internal consistency means that the construct is internally consistent due to the consistency of measures used meanwhile, convergent validity is assessed by evaluating the reliability of each item used to measure the constructs. Convergent validity was evaluated using three analyses: (i) items reliability, (ii) composite reliability and (iii) average variance extracted (AVE). An established rule of thumb states that a construct should explain a significant part of each indicator's variance means that an indicator's loading should be above 0.70. The indicators with loading below the threshold of 0.70 but above 0.40 should only be considered for removal from the scale when deleting the indicator's results in an increase in the composite reliability or AVE (Hair, Hult, Ringle, & Sarstedt, 2014).

The second measure to support the existence of convergent validity is the composite reliability (CR) of each construct. Hair, Sarstedt, et al. (2014) suggest that for reflectively measured measurement model the convergent validity was evaluated from the CR test results because CR provides a more conservative measure of internal consistency reliability. The composite reliability is a measure of the "overall" reliability of the collection of all measures under a certain construct. As a rule of thumb, 0.70 is suggested as a minimum benchmark for acceptable construct reliability (Hair, Hult, et al., 2014). The third evaluation of convergent validity is examining the average variance extracted (AVE) values. An AVE value of 0.50 or higher indicates that on average the construct explains more than half of the variance of its indicators. Table 3 displays the results of the convergent validity analyses.

Table 3. Results of the convergent validity of measurement model

| Construct | Dimension/Variable | Outer Loadings | CR | AVE |
|---|---|---|---|---|
| ERM | Internal Environment | 0.662 | | |
| | Objective Setting | 0.580 | | |
| | Event Identification | 0.612 | | |
| | Risk Assessment | 0.754 | 0.866 | 0.538 |
| | Risk Response | 0.674 | | |
| | Controls Activities | 0.677 | | |
| | Info & Communication | 0.715 | | |
| | Monitoring | 0.749 | | |
| Corporate Governance | Board Size | 0.806 | | |
| | Expertise | 0.755 | 0.775 | 0.633 |
| | Portion NEDs | *0.109 | | |
| | RMC | 0.757 | | |
| Firm Value | Tobin's Q | | 1.000 | 1.000 |

Note: * Variable in italics has been removed due to low loading and Firm Value is a single-item variable.

As shown on Table 3, each dimension of the ERM construct had a satisfactory range of factor loadings. As stated previously, the ERM construct was formed based on eight different dimensions: (1) internal environment, (2) objective setting, (3) event identification, (4) risk assessment, (5) risk response, (6) control activities, (7) information and communication, and (8) monitoring. Each dimension was measured by a group of indicators and from the composite reliability value, which explains the degree to which the construct indicators indicate that the latent construct is 0.866, well above the threshold value of 0.70 (Hair, Hult, et al., 2014) that signifies that all the items have integrated into one dimension. The AVE value of ERM construct is exceeding the threshold value of 0.50 (Hair, Sarstedt, et al., 2014). In conclusion, ERM dimensions have a high level of reliability and convergent validity that demonstrates ERMDi as an efficient measurement of ERM construct.

As for corporate governance constructs; board size, board expertise and RMC yield item loadings are above the threshold value of 0.7, which are 0.806, 0.755 and 0.757 respectively however, a proportion of the NEDs produced very low loading of 0.109. The finding shows that a proportion of the NEDs is at a weak dimension of the corporate governance therefore, this variable was dropped as dimension of corporate governance. Thus, board size, board expertise, and RMC are good dimensions of corporate governance.

### 5.4 Assessment of Structural Model

Once the measurement model had a satisfactory level of validity and reliability, then the second part of the model estimation was conducted, which was to analyse the structural model of the path modelling. In general, the structural model describes the interrelationships among the constructs where the hypothesised relationships within the structural (inner) model were assessed. Assessment of the structural model is important to determine how well the empirical data supports the theory and thus, to decide if the theory has been empirically confirmed. The

structural model was assessed using two criteria that are (i) the level of the R square ($R^2$) values, and (ii) the significance of the path coefficients. Chin (1998) suggests the three level of $R^2$ values; 0.67, 0.33 and 0.19 which are interpreted as substantial, moderate, and weak respectively. PLS-SEM determines path coefficient using the bootstrapping (resampling) procedures. In order to measure the statistical significance of the path coefficients, t-values and significant levels were obtained by applying a nonparametric bootstrapping routine of 500 resamples (Chin, 1998) which is the standard method used to test the significance of PLS path modeling results (Henseler et al., 2009).

The $R^2$ values of both dependent variables can be considered at moderate level; ERM (0.321) and firm value (0.252). The results highlight that the corporate governance construct explained 32.1 % of the total variance of ERM implementation and 25.2 % of the total variance of the firm value. Figure 2 presents the results of the PLS analysis of the structural model.
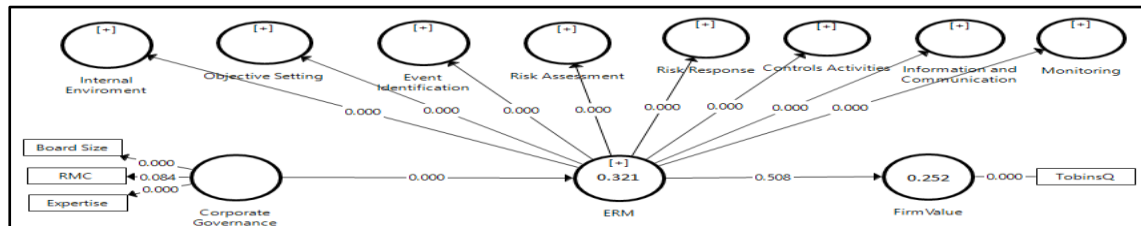


Figure 2: The results of relationship among corporate governance, ERM and firm value

The structural model analyses confirmed that the eight dimensions of ERM was significantly related to the construct, the co-efficient (β) are ranged from 0.795 to 0.901 and are all significant, p<0.00. Board size and board expertise are the significant dimension of corporate governance that influence the implementation of ERM. Table 4 displays results of the hypothesis testing.

Table 4. Path co-efficient and hypothesis testing

| Relationship | Hypothesis | Co-efficient (β) | *t*-value | *p*-value | Support |
|---|---|---|---|---|---|
| CG-ERM | *H₁ | 0.298 | 3.953 | 0.000 | Yes |
| ERM-Firm Value | H₂ | 0.081 | 0.663 | 0.508 | No |

Notes: **$p< 0.01$

The hypothesis testing results confirmed and supported $H_1$ by stating that the corporate governance characteristics in particular board size and board expertise are significant determinants of ERM implementation among Malaysian PLCs. This study therefore, confirmed the significant role of the corporate governance as a driving force to ensure that a company practices a comprehensive and effective risk management technique such as ERM. However, the result does not find any support to the relationship between firm value and ERM. One of the possible reasons could be that the effects of ERM to firm value are still not evident among Malaysian PLCs because of ERM's implementation rate, which is still at a moderate level. Even though ERM has received great attention but still there are companies that are reluctant to accept the system and among the reasons for the unwillingness to accept ERM are the high starting cost, lack of expertise in the company that can implement the new system and lack of buying from top management to start with a new risk management system.

## REFERENCES

Altemeyer, L. (2004). *An assessment of Texas State Government: Implementation of enterprise risk management principles*. Texas State University.

Arena, M., Arnaboldi, M., & Azzone, G. (2011). Is enterprise risk management real? *Journal of Risk Research*, *14*, 779–797. Beasley, M., Pagach, D., & Warr, R. (2008). Information conveyed in hiring announcements of senior executives overseeing enterprise-wide risk management processes. *Journal of Accounting, Auditing & Finance*, *23*(3), 311–333.

Beasley, M. S., Clune, R., & Hermanson, D. R. (2005). Enterprise risk management: An empirical analysis of factors associated with the extent of implementation. *Journal of Accounting and Public Policy*, *24*(6), 521–531.

Blanchard, D., & Dionne, G. (2003). *Risk management and corporate governance*.

Bowling, B. D. M., & Rieger, L. (2005). Sucess factors for implementing enterprise risk management. *Bank Accounting & Finance*, 21–27.

Brown, I., Steen, A., & Foreman, J. (2009). Risk Management in Corporate Governance: A Review and Proposal. *Corporate Governance: An International Review*, *17*(5), 546–558.

Chin, W. W. (1998). Commentary: Issues and opinion on structural equation modeling. *MIS Quarterly*, *22*(1), 7–16.

Demidenko, E., & McNutt, P. (2010). The ethics of enterprise risk management as a key component of corporate governance. *International Journal of Social Economics*, *37*(10), 802–815.

Desender, K. (2007). *On the determinants of enterprise risk management implementation*.

Donaldson, L., & Davis, J. H. (1991). Stewardship theory or agency theory: CEO governance and shareholder returns. *Australian Journal of Management*, *16*(1), 49–65.

Eisenhardt, K. M. (1989). Agency theory: An assessment and review. *The Academy of Management Review*, *14*(1), 57.

Fama, E. F., & Jensen, M. C. (1983). Separation of ownership and control. *Journal of Law and Economics*, *26*(2), 301–325.

Frigo, M. L., & Anderson, R. J. (2011). *Embracing enterprise risk management*.

Gatzert, N., & Martin, M. (2015). Determinants and value of enterprise risk management : Empirical evidence from the literature. *Risk Management and Insurance Review*, *18*(1), 29–53.

Golshan, N. M., & Siti Zaleha Abdul Rasid. (2012). Determinants of Enterprise Risk Management Adoption : An Empirical Analysisof Malaysian Public Listed Firms. *World Academy of Science, Engineering and Technology*, *62*, 15–22.

Gordon, L. a., Loeb, M. P., & Tseng, C.-Y. (2009). Enterprise risk management and firm performance : A contingency perspective. *Journal of Accounting and Public Policy*, *28*(4), 301–327.

Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2014). *A primer on partial least squares atructural equation modeling (PLS-SEM)*. SAGE Publications, Incorporated.

Hair, J. F., Sarstedt, M., Hopkins, L., & G. Kuppelwieser, V. (2014). Partial least squares structural equation modeling (PLS-SEM): An emerging tool in business research. *European Business Review*, *26*(2), 106–121.

Harner, M. M. (2010). Ignoring the writing on the wall : The role of enterprise risk management in the economic crisis. *J. Bus. & Tech. L.*, *5*(1), 45–58.

Henseler, J., Hubona, G., & Ash, P. (2016). Using PLS path modeling in new technology research : Updated guidelines. *Industrial Management & Data Systems*, *116*(1), 2–20.

Henseler, J., Ringle, C. M., & Sinkovics, R. R. (2009). The use of partial least squares path modeling in international marketing. *Advances in International Marketing*, *20*, 277–319.

Hoyt, R. E., & Liebenberg, A. P. (2011). The value of enterprise risk management. *Journal of Risk and Insurance*, *78*(4), 795–822.

Huang, H., Hsu, P., Khan, H. A., & Yu, Y. (2008). Does the appointment of an outside director increase firm value? Evidence from Taiwan. *Emerging Markets Finance & Trade*, *44*(3), 66–80.

Izah, M. T., & Ahmad Rizal, R. (2011). The relationship between enterprise risk management (ERM) and firm value: Evidence form Malaysian public listed companies. *International Journal of Economics and Management Sciences*, *1*(2), 32–41.

Jensen, M. C., & Meckling, W. H. (1976). Theory of the Firm : Managerial behavior , agency costs and ownership structure. *Journal of Financial Economics*, *3*(4), 305--360.

Kleffner, A. E., Lee, R. B., & McGannon, B. (2003). The Effect of Corporate Governance on the Use of Enterprise Risk Management: Evidence From Canada. *Risk Management and Insurance Review*, *6*(1), 53–73.

KPMG LLP. (2001). *Understanding enterprise risk management: An emerging model for building shareholder value*.

Lam, J. (2014). *Enterprise risk managment: From incentives to controls* (second edi). John Wiley & Sons, Inc.

Lazonick, W., & Sullivan, M. O. (2000). Maximizing shareholder value : A new ideology for corporate governance. *Economy and Society Volume*, *29*(1), 13–35.

Lee, L., Petter, S., Fayard, D., & Robinson, S. (2011). On the use of partial least squares path modeling in accounting research. *International Journal of Accounting Information Systems*, *12*(4), 305–328.

Lewis, B. R., Templeton, G. F., & Byrd, T. A. (2005). A methodology for construct development in MIS research. *European Journal of Information Systems*, *14*, 388–400.

Liebenberg, A. P., & Hoyt, R. E. (2003). The determinants of enterprise risk management: Evidence from the appointment of chief risk officers. *Risk Management and Insurance Review*, *6*(1), 37–52.

Lundqvist, S. A. (2014). An exploratory study of enterprise risk management : Pillars of ERM. *Journal of Accounting, Auditing, and Finance*, *29*(3), 393–429.

Mackenzie, S. B., Podsakoff, P. M., & Podsakoff, N. P. (2011). Construct measurement and validation procedures in MIS and behavioral research: Integrating new and existing techniques. *MIS Quarterly*, *35*(2), 293–334.

McShane, M. K., Nair, A., & Rustambekov, E. (2011). Does enterprise risk management increase firm value. *Journal of Accounting, Auditing, and Finance*, *26*(4), 641–658.

Meulbroek, L. K. (2002). Integrated risk management for the firm: a senior manager's guide. *Available at SSRN 301331*, 1–39.

Miccolis, J., & Shah, S. (2000). *Enterprise risk management: An analytic approach*. Tillinghast-Towers Perrin.

Norlida, A. M., Isahak, K., & Mohd Rasid, H. (2010). Enterprise-wide risk management ( EWRM ) practices : Between corporate governance compliance and value. *International Reviews of Business Research Papers*, *6*(2), 239–252.

Pagach, D., & Warr, R. (2010). *The effects of enterprise risk management on firm performance*.

Pagach, D., & Warr, R. (2011). The characteristics of firms that hire chief risk officers. *Journal of Risk and Insurance*, *78*(1), 185–211.

Shleifer, A., & Vishny, R. W. (1997). A survey of corporate governance. *The Journal of Finance*, *52*(2), 737–783.

Siti Zaleha, A. R., & Wan Khairuzzaman, W. I. (2011). Management accounting and risk management in Malaysian financial institutions: An exploratory study. *Managerial Auditing Journal*, *26*(7), 566–585.

Sobel, P., & Reding, K. (2004). Aligning corporate governance with enterprise risk management. *Management Accounting Quartely*, *5*(2), 29–38.

Subramaniam, N. (2006). Agency theory and accounting research: An overview of some conceptual and empirical issues. In *Methodological issues in accounting research: Theories and methods* (pp. 55–77). Spiramus Press Ltd.

Sutton, S. G. (2006). Extended-enterprise systems' impact on enterprise risk management. *Journal of Enterprise Information Management*, *19*(1), 97–114.

Tonello, M. (2007). *Emerging governance practices in enterprise risk management*. SSRN Electronic Journal.

Walsh, J. P., & Seward, J. K. (1990). On the efficiency of internal and External corporate control mechanisms. *Academy of Management Review*, *15*(3), 421–458.

Weir, C., & Laing, D. (2006). Governance structures , director independence and corporate performance in the UK. *European Business Review*, *13*(2), 86–95.

Yatim, P. (2010). Board structures and the establishment of a risk management committee by Malaysian listed firms. *Journal of Management and Governance*, *14*(1), 17–36.

Zahiruddin, G., & Norlida, A. M. (2013). Enterprise risk management and value creation: Initial findings amongst non-financial public listed companies in Malaysian Bourse. *Asian Economic and Financial Review*, *3*(7), 913–922.