



# The Analysis of The Effect Of Internal Audit, IT Capability And CRO Role In The Enterprise Risk Management Implementation On Firm Performance Moderated By Listed Status Among Indonesian State-Owned Enterprises

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**ABSTRACT:** Managing and mitigating risks have become more critical than ever for the management of enterprises nowadays. The management of the enterprises must have a helicopter view in perceiving, analyzing, and assessing risks as it must be regarded from the entire enterprise's perspective (Jie Liu, 2012) as the risk is undoubtedly an inherent part of the corporate strategy of doing business (Dickinson, 2001). Furthermore, currently managing risk is not just doing risk assessment including how to mitigate risk but with enterprise risk management, the goal is to create, protect and enhance shareholder value (Barton et al., 2002). This paper investigates whether the implementation of ERM influences firm performance. This paper also aims to validate which of the following variables: Internal Audit, IT Capability, and CRO Role, affecting ERM implementation on firm performance. Thorough research has been done on listed and non-listed Indonesian State-Owned-Enterprises (SOEs) as the unit analysis. The result showed that all three variables, namely Internal Audit, IT Capability and CRO Role, have positively influenced ERM implementation against firm performance. The findings will contribute new insights for Indonesian SOEs to make use of the tested variables in ERM implementation to improve firm performance.

**Keywords:** enterprise risk management, firm performance, internal audit, CRO role, IT capability, listed status

## I. INTRODUCTION

Risk management is inevitably needed for every organization, especially for enterprises either for private enterprises or state-owned enterprises. However, it is driven better towards the environment with these specific conditions known as VUCA world. According to Lawrence (2013), VUCA is better known as the acronym for volatile, uncertain, complex, and ambiguous. Even though VUCA was originated in a military context, soon it was used widely for projecting the economic environment which has the changing conditions of the "new normal". In addition to this background, economic actors must adapt and change mindset to properly fit the new indicators of a fast-changing, chaotic, and volatile environment.

Therefore, in the VUCA era, managing and mitigating risks have become more important than ever for enterprises' management. The enterprises' management must have a helicopter view in perceiving, analyzing, and assessing risks as it must be regarded from the entire enterprise's perspective (Jie Liu, 2012). Previously, the corporation manages to minimize risk only based on silo approach. Now, the corporation begins to use risk management as the enabler to reach the corporation's objective. This new shift is called Enterprise Risk Management (ERM) (Gordon et al., 2009).

As taking risk is fundamental for doing business, ERM provides tools to manage these risks rationally (Smiechewicz, 2001). ERM is a new approach for companies, a new way of thinking that allows a company to identify and manage its risk. The goal of ERM is to create, protect and enhance shareholder value (Barton et al. 2002). With those characteristics, ERM has emerged as a new paradigm for managing a complex portfolio of company risks (Leibenberg& Hoyt, 2003; Beasley, Clune & Hermanson, 2005).

ERM is not only regarded in the global world. After the ASEAN financial crisis in 1998 followed by the global financial crisis in 2008, Indonesia government fully understood the importance of risk management. Since then, enterprise in Indonesia is obliged to have early warning system enabled to early detect the risks that they will face. Therefore, the Finance Ministry, Financial Service Authority, and the Ministry of SOE released Ministerial Decree in Risk Management. These releases' goal is to prevent the

corporation from falling apart when hit by the financial crisis as they are equipped sufficiently to counter the coming risks through ERM implementation.

These comprehensive decrees imposing the ERM implementation should be sufficient in delivering a positive impact to at least State-Owned Enterprises performances. This is supported by the fact that ERM aims to create, protect, and enhance shareholder value. Hence, Indonesia government expected that by reinforcing these decrees, they could enhance shareholder value, or at least protect it. However, there is evidence that shows otherwise. BPS (Central Statistic Body of Indonesia) conducted a research on SOEs and data derived from the research showed that there was a decline on Return on Asset (ROA) of SOEs during 2014-2016 data indicated that the reinforcement of the decrees was not enough to encourage ERM implementation on the SOEs.

Even though the government has fully supported the implementation of ERM in Indonesia as proven by the release of the said ministerial decrees, which aims for the positive result, it can be seen that it still has little impact in helping SOEs increase their ROAs. On the other hand, ERM implementation has been widely accepted in global context based on the review of empirical studies. Implementing ERM was proven to give positive results on the firm performance from these previous researches. Hence, understanding the overall notion of risk management with its clear context and use cases is important to help the researcher in testing this phenomenon.

Therefore, this paper is aimed to examine the effect of the implementation ERM on the Indonesia SOEs and which factors have the significant influence in determining the success of ERM implementation on firm performance. Hopefully this paper will give novelty of knowledge, insights, and contribution to regulators, State-Owned Enterprises, and other private sectors running in Indonesia regarding the implementation of ERM.

In this study, Internal Audit, IT Capability, CRO Role, and Listed Status are used as the moderated variables to determine which variable significantly influences ERM implementation in giving impact to the firm performance.

## II. LITERATURE REVIEW

### **Theory of the Firm**

A comprehensive theory of the firm under agency arrangements was developed by Jensen and Meckling (1976), who showed that the principals (the shareholders) could assure themselves that the agent will make the optimal decisions only if appropriate incentives are given and only if the agent is monitored. As such, contractual relationships are established as the essences of the firm. The firm is simply one form of legal which serves as a nexus for contracting relationships (Jensen and Meckling, 1976). This theory then emphasizes contracts that can explain why phenomena like outsourcing and entering into joint ventures or strategic alliances as alternatives to direct growth occur. "Unfortunately, these contractual relationships are often flawed by the most fundamental problem which is task delegation, which will be described further by the Agency Theory."

### **Agency Theory**

The Agency Theory is a supposition that explains the relationship between Principal and Agents in the business. Agency theory is concerned with resolving problems in agency relationships due to unaligned goals or different aversion levels to risk. Also, agency theory is concerned with studying problems that arise when one party, the principal, delegates work to another party, the agent (Eisenhardt, 1989; Lassar and Kerr, 1996). Misperception goals and differing risk aversion levels cause an increase of constant monitoring and goal communication to ensure task fulfillment in the task delegation process. In order to solve and minimize this effect, Corporate Governance is then established to address such issues.

### **Corporate Governance**

Dimsdale and Prevezer (1994) observed that Corporate Governance is concerned with how corporations are governed and the relationship between the management of a company and its shareholders. Publicly traded companies in Canada, the United States, and the United Kingdom began to encounter stricter

corporate governance rules and guidelines during the 1990s because of many large corporate failures (Kleffner et al., 2003). The corporate landscape is littered with the wreckage of companies whose directors were either asleep at the wheel or overwhelmed, such as in the case of Bre-X Minerals Ltd. and Livent Inc. to more recent implosions of Nortel Networks Corp. and Moore Corp (Gray, 2001). Due to this increasing number of failures, stricter rules and guidelines were introduced in wide areas.

## Risk Management

One key area addressed by these guidelines is Risk Management. For example, the Toronto Stock Exchange (TSE) guidelines advocate that boards assume responsibility for “the identification of the principal business risks of the corporation’s business, ensuring the implementation of appropriate systems to manage these risks.” (Kleffner et al., 2003). These new corporate governance standards have created a need to develop comprehensive corporate governance strategies that address all risks that a firm faces (Kleffner et al., 2003).

## Enterprise Risk Management

This is when Enterprise Risk Management (ERM) steps in. To understand the notion of ERM comprehensively, I put several references on the definitions of ERM, both from academic journals and business perspectives such as standards-setting organizations, industry publications, industry associations, consulting firms, and rating agencies to be on the same page.

The following references on academic journals were taken from Enterprise Risk Management: Review, Critique, and Research Directions (Bromiley et al., 2014).

Table 1.

Definition of ERM from Academic Journals and Industry

No	Author	Year	Definition
1	Dickinson	2011	ERM is a systematic and integrated approach to the management of the total risks a company faces.
2	Harrington et al.,	2002	ERM is the idea that emerged in the late 1990s that a firm should identify and (when possible) measure all of its risk exposures and manage them within a single unified framework in contrast to the silo approach to risk management.
3	Barton et al.	2002	Enterprise-wide risk management shifts risk management from a fragmented, ad hoc, narrow approach to an integrated, continuous, and broadly focused approach.
4	Liebenberg and Hoyt	2003	Unlike the traditional “silo-based” approach to corporate risk management, ERM enables firms to benefit from an integrated approach to managing risk that shifts the focus of the risk management function from primarily defensive to increasingly offensive and strategic. ERM enables firms to manage a wide array of risks in an integrated, holistic fashion.
5	Miller and Waller	2003	Integrated risk management in consideration of the full range of uncertain contingencies affecting business performance.
6	AS/NZS 4360 Risk Management Standard	1995	Risk management is the culture, processes, and structures directed towards the effective management of potential opportunities and adverse effects.
7	COSO	2004	ERM is a process, effected by an entity’s board of directors, management and other personnel, applied in strategy setting and across the enterprise, designed to identify potential events that may affect the entity, and manage risk to be within its risk appetite, to provide reasonable assurance regarding the achievement of entity objectives.

8	ISO 31000		Risk management is coordinated activities to direct and control an organization concerning risk.
9	RIMS	2011	ERM is a strategic business discipline that supports the achievement of an organization's objectives by addressing the full spectrum of its risks and managing the combined impact of those risks as an interrelated risk portfolio.
10	Institute of Internal Auditors	2001	Enterprise risk management is a rigorous and coordinated approach to assessing and responding to all risks that affect the achievement of an organization's strategic and financial objectives.

No 1 to 5 are definitions of Enterprise Risk Management from academic journals, and No 6 to 10 are derived from standards-setting organizations, industry publications, industry associations, consulting firms, and rating agencies.

Further studies prove the satisfactory performance ERM implementation brings through the positive results. Pagach and Warr (2010) find that firms with increased leverage, low cash reserves, and volatile earnings gain from ERM. Their study on 106 US companies observes a significant decrease in stock price volatility after implementing ERM (CRO appointment as proxy), and the results are pronounced more for firms with positive abnormal returns.

Furthermore, Ahmad, Ng & McManus (2014) in their review of the top ASX300 companies in Australia find an extensive implementation of ERM, which suggests that ERM implementation does have a positive impact to the companies rather than those which do not implement ERM. The majority of the sample firms among the top 300 Australian listed companies implemented ERM were at the complete implementation phase and have implemented ERM for more than five years, embedded ERM into their corporate strategic processes (Saudah Ahmad, Chew Ngb, Lisa Ann McManus, 2014).

Previous studies on ERM provide deeper insight on the efficacy and context of ERM implementation. Both studies agreed that ERM implementation brought more values to the firms compare to ones which do not implement ERM. Pagach and Warr (2010) suggested specific types of firms which could gain more benefit by implementing ERM, while Ahmad et al (2014) concurred that one of the key factors to achieve ERM goals was complete and thorough implementation ERM. These studies gave more specificities for the success of ERM implementation, which could be used as the recommendations in the policy making or guidelines.

However, there are differing perspectives on the impact of ERM implementation as well. ERM is not adopted just to enhance the firm value. According to Manab, Kassim and Hussin (2010), the main objective of the financial firm of implementing ERM in Malaysia is business survival rather than value creation. Their main goal is to survive the competition by managing the risks strategically. Manab et al (2010) later confirmed that the results showed that ERM implementation in the previous year has a strong negative relationship with firm value. It supports the argument that the effect of ERM is not immediately realized and entails a high implementation cost. The findings provide useful input and insights in formulating new policy with corporate governance, particularly ERM in Malaysia.

Understanding the gaps and appropriate use cases of ERM in a global context provide wider and deeper insights of ERM implementation. These insights will be beneficial for the betterment of policy and regulation formulation, in order to release more effective and suitable decrees in encouraging the application of ERM practices.

### III. THEORETICAL FRAMEWORK AND HYPOTHESIS DEVELOPMENT

#### 3.1 Internal Audit affects Firm Performance

Auditing is crucial in any business line-up. Apart from compulsory or regulatory requirements, it could be considered a way to mediate and moderate agency conflicts and information asymmetries (Cohen, Holder-Webb, Nath, & Wood, 2011; Voeller et al., 2013; Watts & Zimmerman, 2014). Similarly, Ismail et al. (2008) conducted research in Malaysia, which confirmed that the presence of internal audit and its quality guarantee a positive influence and financial performance. This can happen because internal audits are aggressively driving their various resources to back the organization in improving their business performance, as supported by Warren et al. (2011). Furthermore, the positive relationship between the

experience of internal audit and firm performance is further proved by Al-Matari et al (2014). This is also supported by Ndimutu (2018), who argued that internal audit is an essential part of management and a tool for enhancing performance of organizations. Moreover, Hutchinson & Zain (2009), stated that internal audit quality is a primary factor that influences internal audit contribution to firm performance. Mpakaniye (2017) implied that the ultimate goal of internal audit is to achieve better returns for the organization in shape of improved firm performance. We can propose that there is a relationship between Internal Audit to Firm Performance. As such the first hypothesis proposed of this study is as follows (stated in an alternative form)

H1: Internal Audit affects Firm Performance

### **3.2 IT Capability affects Firm Performance**

Organizations need to consider IT as an important factor in the face of increasing competition, higher performance levels, globalization, and liberalization. IT plays a key role in achieving an organization's objectives. IT relates to all aspects of the business processes, including access to a shared infrastructure consisting of knowledge, human assets, core competencies, resource allocation, performance management, project tasking and communication support (Mutsaers, Zee and Giertz, 1998). Shin (1999) focuses on using IT to redesign business processes and improve business profitability and productivity. IT relates to better information processing, sharing, fast responsiveness, and better coordination between separate organizational units and across organizations. Moreover, IT is associated with reducing costs such as documentation, decision information and cost-effective monitoring or performance evaluation device. Additionally, an organization is on such a large scale that it would be difficult for members to communicate and share information without an information technology infrastructure (Hasanali, 2002). Information Technology can enable quick searches, access and retrieval of data, and support communication in an organization. Therefore, the third hypothesis we proposed of this study is as follow:

H2: IT Capability affects Firm Performance

### **3.3 CRO Role affects Firm Performance**

CRO appointment is assumed to have a positive influence on firm performance. This is supported by a study conducted by Liebenberg and Hoyt (2003). Their research focuses mainly on the determinants of the ERM adoption. It shows the importance of appointing a CRO to reduce information asymmetry, implement and manage the ERM program so that it can positively influence the firm performance. In another study, Hoyt and Liebenberg (2006) discover that size, institutional ownership and international diversification are significant in determining the ERM adoption among US insurance companies. In addition to their studies, Hoyt and Liebenberg (2011) found a positive relationship between firm value and the presence of a CRO. In a study conducted with the focus on banks and public utilities, Pagach and Warr (2007) found that a 10% increase in leverage increases by 7.8% the probability for companies to hire a CRO. This means that the presence of CRO has positive impact to the firm performance. In addition to their conclusion above, it is also found that a 10% size increase increases by 27% the above probability, and a 10% increase of earnings results in 4.7% likelihood to hire CRO. In another study conducted by Pagach and Warr (2010), they found that firms with increased leverage, low cash reserves, volatile earnings gain from ERM. Their study on 106 US companies observed a significant decrease in stock price volatility after the implementation of ERM (CRO appointment as proxy), and the results are pronounced more for firms with positive abnormal returns. This is also supported by Clune and Hermanson (2005) whose research examined factors associated with the stage of ERM implementation at various US and international organizations. They found the stage of ERM implementation to be positively related to the appointment of CRO. Lastly, Gordon et al. (2009) found that the relationship between ERM and firm performance depended on how well ERM implementation was matched with firm-specific factors, especially the appointment of CRO. As such, the sixth hypothesis proposed of this study is as follow:

H3: CRO Role affects Firm Performance

### **3.4 ERM Implementation affects Firm Performance**

Soltanizadeh et al. (2014) analysis show that ERM partially mediates the relationship between cost leadership strategy and organizational performance. Therefore, there is a significant relationship between enterprise risk management and organizational performance and some direct relationship between cost leadership strategy and organizational performance (Soltanizadeh et al., 2016). Bertinetti et al. also found a positive statistically significant relationship between ERM adoption and firm value (Bertinetti et al., 2013). Other studies confirming the positive relationship between ERM implementation and firm performance are: results of the empirical analysis show that ERM implementation has a significant



positive impact on firm's performance (Shad &Woon-Lai, 2015); the study provides strong evidence of a positive relationship between Enterprise Risk Management implementation and performance in the Nigerian banking sector (Soliman & Adam, 2017); the results show that firms with advanced levels of ERM implementation present higher performance, both as financial performance and market evaluation (Florio & Leoni, 2016); and the basic argument presented in this paper is that the relation between ERM and firm performance is contingent upon the appropriate match between ERM and the following five factors affecting a firm: environmental uncertainty, industry competition, firm size, firm complexity, and board of directors' monitoring (Gordon et al., 2009). In conclusion, several journals supported the hypothesis that ERM implementation has a positive impact on firm performance. However, other journals denied the positive relationship between ERM implementation and firm performance. Since the journals mentioned above do not have Indonesia setting in the study, we would still like to validate that ERM implementation may influence firm performance. Therefore, the seventh hypothesis proposed of this study is as follow:

H4: ERM Implementation positively affects Firm Performance

### **3.5 Internal Audit affects ERM Implementation**

As the theory of the firm by Jensen and Meckling (1976) suggests, the principals (the shareholders) can assure themselves that the agent will make the optimal decisions only if appropriate incentives are given and only if the agent is monitored. ERM implementation will be more effective if there is an Internal Audit to monitor the implementation process. Audit means to assess whether ERM has been appropriately implemented and all variables have been put into the analysis. Internal audit is well positioned to assist management in fulfilling its risk management responsibilities by testing, as part of their internal mandate, the effectiveness of controls that are implemented to mitigate risks as well as assessing the overall effective functioning of the risk management process (Ackermann & Marx, 2016). Similarly, internal audit can assist audit committees in order to fulfill their internal control, risk management and governance oversight responsibilities (Guillot, 2013). According to Ackermann & Marx (2016), there is thus a growing demand for managing risk through the process of risk management and internal audit is in a perfect position to assist with the improvement of such processes. Hence, internal audit should provide information availability to audit committee on matters concerning risk management internal control and governance (Sarens et al., 2009). In addition, when deciding whether risk management processes are effective or ineffective is the matter of judgement once internal auditor has done the assessment (Arena &Azonne, 2007). As internal audit is closely related to the success of how internal auditors provide reliable and unbiased judgements, it is important to also look at internal auditors' role in ERM, as internal auditing provides information which includes assessing the effectiveness in risk management (Raida, 2012). Zwann et al. (2010) argued that internal auditors' role in ERM is making recommendations to improve the organisation's risk processes. Allegrini and D'Onza (2003), also stated that internal auditors usually assert to participate in the risk management team and to provide some contribution in the qualitative assessment of operational risks. This is align with the finding from Drogalas&Siopi (2017), that internal audit plays a key role in monitoring a company's risk profile and identifying areas for improving risk management processes. Finally, as expected, internal audit engagement in ERM can add value to the organization (Zwann et al., 2010). We can propose that there is a relationship between Internal Audit to ERM implementation. From the studies above, the second hypothesis proposed of this study is as follows:

H5: Internal Audit affects ERM implementation

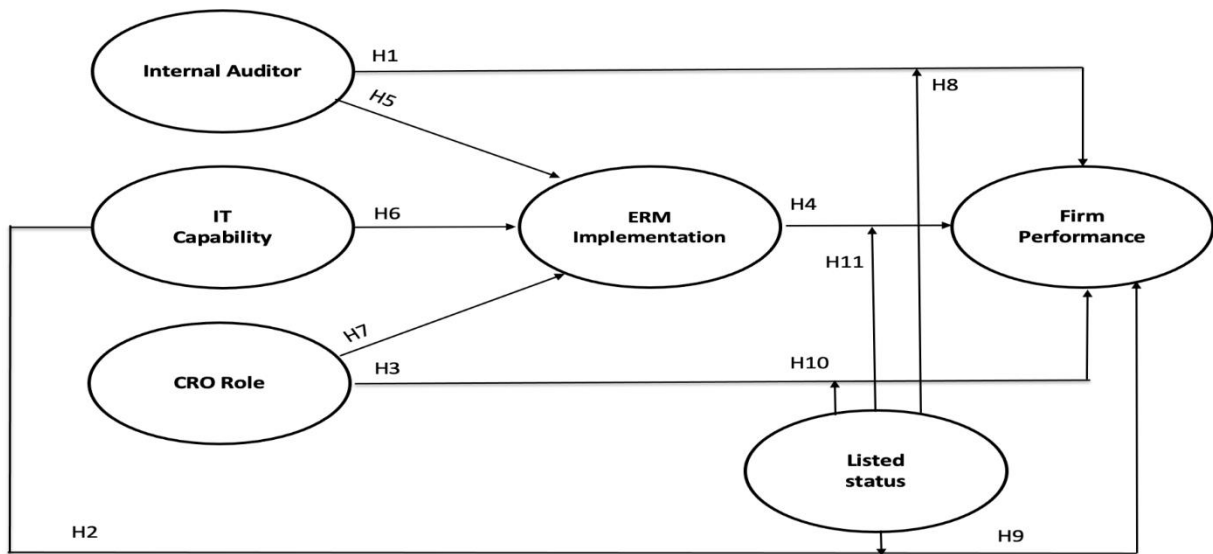


Figure 1. Research Framework

### 3.6 IT Capability affects ERM Implementation

Xenomorph (2007) argues that "Effective risk management is impossible without effective information technology" and describes the IT architecture necessary for this. Rolland (2008) suggests using IT to drive effective risk management. IT can create an essential link between risk management and corporate performance. IT provides data security by employee level, limiting a user's access by time, business line, business activity and individual risk. IT tools collect data used in the past to learn through experience and avoid repeating the same mistakes. Effective risk management information makes it more valuable for decision making. Therefore, Information Technology (IT) is another imperative factor for successful risk management. In addition, business intelligence tools have been used to enhance risk management, as confirmed by Dash Wu et al. (2013). Not only that, there is one more study that confirms IT as one of the critical success factors to increase the effectiveness of risk management procedures (Na Ranong et al., 2009). From the studies above, the fourth hypothesis proposed of this study is as follow:

H6: IT Capability affects ERM implementation

### 3.7 CRO Role affects ERM Implementation

Liebenberg & Hoyt (2003) found that more highly leveraged firms are more inclined to appoint CROs. These firms are likely to derive greater value from the CRO's ability to reduce the costs associated with the risk-shifting problem and communicate its risk profile to external stakeholders. Furthermore, one more survey reveals that the quality of CRO significantly influences the organization to practice ERM in a study conducted by Daud et al. (2010). Based on research by Erastus Karanja (2017) results reveal that many ERM implementations are occurring at the firm/entity level, and with the exception of reporting, firms consider ERM to be a strategic firm resource capable of improving business operations and compliance initiatives. CRO is the role position that responsible to implement ERM as well as one of the plans that top management put in place to address risks at the enterprise level and the other finding is most of the framework used by organization are COSO and ISO 31000. Supported by the journals above, the fifth hypothesis proposed of this study is as follow:

H7: CRO Role affects ERM implementation

### 3.8 Internal Audit affects Firm Performance when moderated by Listed Status

Several studies on Internal Audit suggest that Internal Audit has a positive relationship to firm performance. However, maintaining the success of the Internal Audit is more difficult if there is non-compliance in place. According to Paape and Spekle (2012), listed firms are subjected to a particular class of regulation, and non-compliance of the regulation will happen less likely than non-listed firms. Furthermore, they argued that ERM implementation would be more likely to happen if there is government regulation and that listed firms will have more fully-developed risk management systems. Hence, the likelihood of non-listed firms seeing the positive impact to firm performance through the

performance of Internal Audit will be slim, and in listed firms, Internal Audit will have more significant influence to the firm performance as they tend to be more compliant and have a more fully-developed risk management practices in place. Therefore, the eighth hypothesis proposed of this study is as follow:

H8: Internal Audit affects Firm Performance if moderated by Listed Status

### **3.9 IT Capability affects Firm Performance when moderated by Listed Status**

It can be seen from the studies above that IT Capability holds a vital role in firm performance. However, smaller companies or non-listed firms are not likely to have a complete IT Capability in place due to the enterprise's budget and/or complexity. They also tend to not have a fully regulated Information and Communication Technology policies and procedures in place. Several studies suggest that IT Capability significantly affects firm performance as it helps the company in streamlining the business process and enabling real-time communication. Listed firms are likely to benefit from this factor as they tend to have a fully developed IT Capability in place to support the business due to their company size or complexity. Furthermore, IT Capability in listed firms will likely be more comprehensive, as they usually have complete policies and procedures that follow the applicable regulations. This is also supported by Paape and Spekle (2012), that stated that listed firms are subjected to a particular class of regulation, and non-compliance of the regulation will happen less likely than non-listed firms. Hence, the likelihood of non-listed firms seeing the positive impact on firm performance through IT Capability's performance will be slim, and IT Capability in listed firms will have a more significant effect on firm performance than their counterparts. As such, the ninth hypothesis proposed in this study is as follow:

H9: IT Capability affects Firm Performance if moderated by Listed Status

### **3.10 CRO Role affects Firm Performance when moderated by Listed Status**

Liebenberg and Hoyt (2003) assumed that CRO appointment would have a positive influence on firm performance. As CRO appointment means there are a dedicated department and authority to manage and oversee the overall risk enterprise. In the case of a listed firm, a study conducted by Liebenberg and Hoyt (2003) assumed that CRO appointment would positively influence firm performance, which is considered more beneficial than one that does not. As CRO appointment means there are a dedicated department and authority to manage and oversee the overall risk enterprise. This will likely happen to listed firms, as they tend to be bigger in size and more complex in nature. In these firms, CRO would likely be appointed, and policies and procedures are developed more fully. However, this would likely not to happen to non-listed firms as they tend to be smaller in size and less complex in their organizational structure. Having CRO in place is not mandatory for their case even because there are no current applicable regulations. This is supported by Paape and Spekle (2012), that stated that listed firms are subjected to a particular class of regulation, and non-compliance of the regulation will happen less likely than non-listed firms. Hence, the likelihood of non-listed firms seeing the positive impact on firm performance through the performance of CRO will be slim, and CRO in listed firms will have a more significant effect to firm performance than their counterparts. Therefore, the tenth hypothesis proposed of this study is as follow:

H10: CRO more significantly affects Firm Performance if moderated by Listed Status

### **3.11 ERM Implementation affects Firm Performance when moderated by Listed Status**

According to Paape and Spekle (2012), listed status are subjected to a particular class of regulation, and non-compliance of the regulation will happen less likely than non-listed firms. The ERM implementation will be more likely to happen if there is government regulation and that listed firms will have more fully-developed risk management systems. Listed companies are also more likely to disclose their financial reports (Singhvi and Desai, 1971). Financial disclosure is included in Corporate Governance, where it is a part of risk management practices. Therefore, the listed status influences the ERM implementation in increasing firm performance. Hence, the eleventh hypothesis proposed of this study is as follow:

H11: ERM Implementation more significantly affects Firm Performance if moderated by Listed Status

## **IV. METHODOLOGY**

### **4.1 Data Collection**

This study uses purposive sampling. Purposive sampling, also known as selective sampling, is a form of non-probability sampling where researchers rely entirely on their judgment when choosing members to be involved in the study. According to Tahir (2011), purposes of sampling reduce the number of objects or people studied, the amount of energy involved, the time required, and the costs involved, make conclusions or summaries of a high number of phenomena and highlighting the general characteristics of



the population. In total, there are 114 State-Owned Enterprises in Indonesia. However, only 50 companies were chosen as the unit analysis in this study. These 50 companies have been carefully selected to represent 144 companies by using purposive nonprobability sampling. In addition, there are some criteria applied to choose the SOEs. First, each of the SOEs selected should have total assets more than 250 billion rupiah. Hence, according to the asset analysis, assets of the 50 companies in 2018 amounted to Rp 8.000 billion, whereby if the assets of all 114 companies were combined, the total was only Rp 8,300 billion. Therefore, it can be seen that these 50 companies have represented more than 90% of the assets. Second, as the researcher would like to examine the listed status as the moderating variable in this study, 19 companies from the sample chosen were listed companies. The target respondent is the representative of the company with the minimum position of Manager. Respondent of the sample is defined as Managers to Board of Director members or personnel of SOEs in Indonesia who involved directly in ERM implementation and adoption process. These involvements will help increase the validity of their response to each indicator in questions and reduce bias if they encounter different ERM implementation experiences. Full questionnaires for interview purpose can be seen in Appendix 1 and Appendix 2 shows the list of target companies and a number of samples.

#### 4.2 Measures

In this study, all indicators in the questionnaire are developed based on the previous studies. Additional demography data will be required such as age, gender, and education level. Some part of the questions will be asked to the respondents by using a six point-scale of Likert (strongly disagree – strongly agree), some others will be using interval scale and the rest by using binary scale (see Appendix 1). There are five latent variables IT Capability (ITC), Internal Audit (IA), CRO Role (CRR), ERM Implementation (ERM), and Firm Performance (FP) used in this study(see Appendix 1).

#### 4.3 Data Analysis

Data analysis in this study used Structural Equation Modeling (SEM). SEM is a multivariate statistical analysis technique which enables researchers to incorporate unobservable variables measured indirectly by indicators variables. SEM refers to a family of procedures (Kline, 2005) that is primarily used to test theoretical models involving proposed causal associations among a set of variables (Schumaker& Lomax, 2016; Manurung, 2019). PLS-SEM is a structural equation modelling method that allows users to estimate complicated cause-effect relationships with latent variables. PLS-SEM has been widely applied in the following fields; marketing (e.g., Henseler et al., 2009), management information system (e.g., Chin et al., 2003), organization (e.g., Sosik et al., 2009), behavioural sciences (e.g., Bass et al., 2003), and business strategy (e.g., Hulland, 1999). SEM can be decomposed into two sub-models, which are measurement model and structural model. Measurement models define a relationship between observed variables (OVs) and their latent variable (LV). The structural model defines relations among latent variables (LVs). In this study, we chose Covariance-based SEM (CB-SEM), and used SmartPLS. This is a software with a graphical user interface for variance-based structural equation modelling (SEM) using the partial least squares (PLS) path modelling method (Wong, 2013).

Some criteria used in SEM as follows; the first process begins with testing the hypothesis's reliability (0.7). Not only that, but we also need to check Composite Reliability (CR) (0.7) to show how consistent each indicator is in measuring construct variables along with the communality value (0.5). Reliability is defined as the consistency of observation, whether by other observers or by the same observer at a separate time, the observation will be similar (Sekaran & Bougie, 2016). A questionnaire is deemed reliable if one's answer against a statement is consistent or stable from time to time (Ghozali, 2011). The second process is testing validity. To check the measurement model's validity, the Average Variance Extracted (AVE) value must be above > 0.5, and its Standardized Loading Factor must be above > 0.7. Hence, the validity test is aimed to assess whether the questionnaire's questions are able to measure accurately. Validity test is conducted by comparing the value of  $r$  count to  $r$  table for a degree of freedom ( $df$ ) =  $n - 2$  with alpha 0,05, in this case,  $n$  is the number of samples (Ghozali, 2011). While according to Ferdinand (2006), valid represents the ability of the instruments used in the study to measure what is intended to measure. The following are the indicators used as the base of the decision-making process whereas if  $r$  count is positive and  $r$  count >  $r$  table, then the variable is deemed valid and vice versa. The third step is to test the T-Statistics, where it is used to check each independent variable's influence towards the dependent variable (Yim, Nahm, Han, & Park, 2010). T statistics are used for deciding whether you should support or reject the null hypothesis, and it must be above 1.96 (Manurung&Budiastuti, 2019). The greater the magnitude of T statistics, the greater the evidence against the null hypothesis. The last is the outer loading used to view the correlations between the latent variable

and the indicators from the outer model in SmartPLS Software. According to Hulland (1999), outer loading should be greater than 0.40 or higher. The result will be used as the base for hypotheses testing and to conclude whether the research hypotheses are accepted or not accepted.

Table 2.  
Demographic Profile of the sample (n:50)

	n = 50	(%)		n = 50	(%)
1. Sector industry			5. Asset (In Bn)		
Agriculture	3	6	0 - 1.000	2	4
Construction	6	12	1.000 - 2.500	1	2
Financial and Insurance	14	28	2.500 - 5.000	7	14
ICT	1	2	5.000 - 10.000	5	10
Mining	4	8	10.000 - 25.000	11	22
Oil and Gas	3	6	25.000 - 50.000	10	20
Processing	9	18	50.000 - 100.000	5	10
Transportation	10	20	100.000 - 250.000	4	8
2. Job Position			Above than 250.000	5	10
Director	1	2	6. Revenue (In Bn)		
Senior Vice President	21	42	0 - 1.000	3	6
Vice President	5	10	1.000 - 2.500	8	16
Manager	19	38	2.500 - 5.000	7	14
Supervisor	4	8	5.000 - 10.000	7	14
3. Gender			10.000 - 25.000	12	24
Male	41	82	25.000 - 50.000	6	12
Female	9	18	50.000-100.000	4	8
4. Total Employee			100.000 - 250.000	1	2
0 - 1.000	10	20	250.000 - 500.000	2	4
1.000 - 2.500	11	22	7. Profit/Loss (In Bn)		
2.500 - 5.000	9	18	<1.000	6	12
5.000 - 10.000	5	10	0-250	12	24
10.000 - 25.000	9	18	250 - 500	4	8
25.000 - 50.000	4	8	500 - 1.000	6	12
50.000 - 100.000	2	4	1.000 - 2.500	11	22
			2.500 - 5.000	5	10
			5.000 - 10.000	1	2
			10.000 - 25.000	2	4
			25.000 - 50.000	3	6

## V. RESEARCH RESULT

### Measurement model

The confirmatory factor analysis is performed in two stages, namely: a) validity and reliability, and b) hypothesis testing. The results of first order CFA analysis are then summarized in Table 3.

Table 3.  
Research Result for Validity and Reliability

Latent variable	SLF (>0.5)	T-Count	Standard Error	Composite Reliability (CR)(>0.7)	Variance Extract (VE)(>0,5)	Conclusion
<b>Internal Audit</b>				0.913653	0.779399	Reliable
Involvement in ERM Implementation (IA1)	0.898	44.437648	0.029347			Valid

Involvement in Development of ERM Framework (IA2)	0.832	21.993865	0.017645			Valid
Influence of the Internal Audit (IA3)	0.917	46.807808	0.018729			Valid
<b>IT Capability</b>				0.972519	0.921868	Reliable
IT as an Enabler to Manage Risk (IT1)	0.942	86.113453	0.011815			Valid
Role IT in ERM (IT2)	0.978	263.314476	0.007221			Valid
IT Enhances Risk Assessment Process (IT3)	0.960	141.863155	0.011587			Valid
<b>CRO Role</b>				0.969575	0.841607	Reliable
Responsible for the development a standardized ERM Framework (CRO1)	0.917	52.132898	0.008013			Valid
Responsible for the implementation of ERM (CRO2)	0.930	61.214263	0.007860			Valid
Responsible for the continuation of innovative ERM Implementation (CRO3)	0.938	67.246501	0.006970			Valid
Responsible for maintaining relationships with key stakeholders (CRO4)	0.931	53.230982	0.008215			Valid
Responsible to oversee compliance (CRO5)	0.900	28.443407	0.009611			Valid
Responsible to maintain a cost benefit of the ERM implementation (CRO6)	0.887	23.106839	0.010959			Valid
<b>ERM Implementation</b>				0.905838	0.620057	Reliable
ERM Implementation Stages (ERM1)	0.744	14.433910	0.012267			Valid
Objective Setting (ERM2)	0.805	15.995549	0.017157			Valid
Risk Identification (ERM3)	0.870	27.751494	0.013238			Valid
Risk Monitoring (ERM4)	0.805	24.566288	0.015089			Valid
Risk Response (ERM5)	0.887	43.343936	0.015644			Valid
Risk Reporting Frequency (ERM6)	0.572	8.650783	0.020245			Valid
<b>Firm Performance</b>				0.961937	0.835184	Reliable

Finance and performance (FP)	0.827	16.599273	0.013526			Valid
Customer Relationship (CR)	0.938	61.577565	0.007279			Valid
Organizational Effectiveness (OE)	0.954	91.999547	0.008999			Valid
People Development (PD)	0.941	84.168809	0.011134			Valid
Future Initiatives (FP5)	0.902	45.363614	0.008962			Valid

The validity and reliability result in Table 3 demonstrates that all SFL of the latent variable score (LVS) exceed 0.50 (from 0.572 to 0.978), indicating good validity. The CR values of the constructs all exceed the 0.70 value (from 0.90 to 0.97), and the VE values for all constructs exceed 0.50 (from 0.62 to 0.92), indicating good reliability.

### Hypothesis testing

The structural model analysis is performed to determine whether a research hypothesis is accepted or rejected. The hypothesis is accepted if the t-value > 1.96, with a positive or negative coefficient. The results of hypothesis tests are summarized in Table 2 and the structural equation modelling result is shown in Figure 2. Tables 4 show the direct and total effect of the model to be used to analyse further the research model.

Table 4.

Path Coefficient (Results from 50 Indonesian SOEs)

Hypothesis	Original Sample	Standard Deviation	Standard Error	T-	Conclusion
				Statistics	
H1: Internal Audit affects Firm Performances	-0.014	0.1035	0.10359	0.1351	Negative
H2: IT Capability affects Firm Performance	0,1993	0.1292	0.1292	2.2239	Positive
H3: CRO Role affects Firm Performance	-0.123	0.1516	0.1516	0.8105	Negative
H4: ERM Implementation positively affects Firm Performance	0,4875	0.0845	0.0845	8.3060	Positive
H5: Internal Audit affects ERM implementation	0,2569	0.1125	0.1125	3.2866	Positive
H6: IT Capability affects ERM implementation	0,179	0.0123	0.0912	1.9655	Positive
H7: CRO Role affects ERM implementation	0,2590	0.1460	0.1460	2.5513	Positive
H8: Internal Audit affects Firm Performance if moderated by Listed Status	0,3722	0,9416	0,9416	0,3954	Negative
H9: IT Capability affects Firm Performance if moderated by Listed Status	1,1863	1,0118	1,0118	8,1394	Positive
H10: CRO more significantly affects Firm Performance if	-0.8411	1,2152	1,2152	4,8062	Positive

moderated by Listed Status					
H11: ERM Implementation more significantly affects Firm Performance if moderated by Listed Status	-0.5830	1,2576	1,2576	3,2193	Positive

Herewith the explanation from the result of Table 4

1. The first hypothesis to be tested is the direct effect of Internal Audit on Firm Performance. Based on the outcome, Internal Audit has no effect on Firm Performance. With T-Statistics value of 0,135169 whereby it is lower than T-table (1,96), it can be concluded that Internal Audit influence is negative towards Firm Performance.
2. Hypothesis 2 indicates the relationship of IT Capability on Firm Performance. Based on the results of testing the third hypothesis, it was stated that the coefficient (0.287) is positive and T statistics (2,223936) is greater than T table (1,96). Therefore, it can be concluded that IT Capability influence is positive towards Firm Performance.
3. The third hypothesis to be tested is the direct effect of CRO on Firm Performance. Based on the outcome, CRO has no effect on Firm Performance. With T-Statistics value of 0,810594 whereby it is lower than T-table (1,96), it can be concluded that CRO influence is negative towards Firm Performance.
4. Hypothesis 4 indicates the relationship of Internal Audit on Enterprise Risk Management. Based on the results of testing the second hypothesis, it was found that the coefficient (0.370) is positive and T statistics (3,286634) is greater than T table (1,96). Therefore, it can be concluded that Internal Audit influence is positive towards Enterprise Risk Management.
5. Hypothesis 5 indicates the relationship of IT Capability on Enterprise Risk Management. Based on the results of testing the fourth hypothesis, it was stated that the coefficient (0.179) is positive and T statistics (1,965515) is greater than T table (1,96). Therefore, it can be concluded that IT influence is positive towards Enterprise Risk Management.
6. Hypothesis 6 indicates the relationship of CRO on Enterprise Risk Management. Based on the results of testing the fifth hypothesis, it was stated that the coefficient (0.373) is positive and T statistics (2,551388) is greater than T table (1,96). Therefore, it can be concluded that CRO influence is positive towards Enterprise Risk Management.
7. Hypothesis 7 indicates the relationship of Enterprise Risk Management on Firm Performance. Based on the results of testing the seventh hypothesis, it was stated that the coefficient (0.702) is positive and T statistics (8,306091) is greater than T table (1,96). Therefore, it can be concluded that Enterprise Risk Management influence is positive towards Firm Performance.
8. Listed status function as moderator between the effect of Internal Audit on Firm Performance is negative. Based on the outcome, Internal Audit has no effect on Firm Performance. With T-Statistics value of 0.3954 whereby it is lower than T-table (1.96), it can be concluded that Internal Audit has no impact on Firm Performance.
9. Listed status function as a moderator between the positive influence of IT Capability on Firm Performance. This can be seen from the T-count 8.1394 which is greater than T-table 1.96. The large positive coefficient of 1.1863 means that the effect of IT Capability for listed (1) companies results in a higher firm performance value than the effect of IT Capability which is not listed (0). It can also be said that the effect of IT Capability on firm performance for companies that are listed (1) is greater than the effect of IT Capability on firm performance for companies that are not listed (0).
10. Listed status function as a moderator between the positive influence of CRO on Firm Performance. This can be seen from the T-count value of 4.8062 which is greater than T-table 1.96. The negative coefficient is -0.8411 reflects that CRO will have a positive effect on Firm Performance when interacting with Listed Status, the negative sign shows that the effect of CRO for non-listed companies (0) which results in a higher firm performance value than the effect of listed CROs (1). Hence it can also be said that the effect of CRO on firm performance for non-listed companies (0) is greater than that of CRO on firm performance for companies that are listed (1).
11. Listed status function as a moderator between the positive influence of ERM on Firm Performance. This can be seen from the T-count 3.2193 which is greater than T-table 1.96. The negative coefficient is -0.5830, which means that the effect of ERM for non-listed companies (0) results in a higher Firm Performance value than the effect of ERM that is listed (1). It can also be said that the effect of ERM on



Firm Performance for non-listed companies (0) is greater than the effect of ERM on Firm Performance for companies that are listed (1).

Table 5.

Total Effect

Hypothesis	Original sample	Standard Deviation	Standard Error	T-	Conclusion
				Statistics	
H1: Internal Audit affects Firm Performances	0,245753	0,145948	0,145948	1,68384	Rejected
H2: IT Capability affects Firm Performance	0,413218	0,135801	0,135801	3,042816	Accepted
H3: CRO Role affects Firm Performance	0,138716	0,198485	0,198485	0,698872	Rejected
H4: ERM Implementation positively affects Firm Performance.	0,701947	0,08451	0,08451	8,306091	Accepted
H8: Internal Audit affects Firm Performance if moderated by Listed Status	0.05361	0.135573	0.135573	0.395433	Rejected
H9:IT Capability affects Firm Performance if moderated by Listed Status	11.863	1,011805556	1,011805556	8.139.407	Accepted
H10: CRO more significantly affects Firm Performance if moderated by Listed Status	-0.841116	0.175007	0.175007	4.806.186	Accepted
H11: ERM Implementation more significantly affects Firm Performance if moderated by Listed Status	-0.582984	0.181088	0.181088	3.219.336	Accepted

Herewith the explanation from the result of Table 5

#### Non-moderated Variables Implication on Enterprise Risk Management.

Table 5 summarizes the total effect of each variable. Based on Manurung and Budiastuti, 2019. the hypothesis is accepted if the t-value > 1.96, with a positive or negative coefficient. It can be seen that the results from hypothesis testing have described that Internal Audit, IT Capability and CRO Role have significant influence on ERM and this is supported by the referred theories.

The followings are theoretical research implications based on the result of this research. Internal Audit positively affects ERM, as supported by De Zwaan et al (2011) in Internal Audit involvement in Enterprise Risk Management that mentions that IA has some impacts on the ERM implementation. IT positively affects ERM implementation, as supported by Na Ranong et al (2009) as they described that IT is one of the critical success factors to increase the effectiveness of risk management produces. It is found that

having good IT capability in place will help to accelerate ERM implementation as it helps in regular and real time monitoring, especially for the companies which have many branches all over Indonesia. Hence, IT has significant influence on the ERM implementation. CRO positively affects ERM implementation, as supported by Liebenberg and Hoyt (2003), Clune and Hermanson (2005), and Yazid (2010). Liebenberg and Hoyt (2003) have mentioned that more highly leveraged firms are more inclined to appoint CROs. Having CRO in place significantly influences ERM implementation as the companies are likely to derive greater value from the CRO's ability in putting good ERM in place. This is also supported by Yazid (2010), as CRO holds influential responsibilities to maintain and drive ERM forward as he/she is the one in charge for the development of the standardized ERM, continuation of innovative ERM implementation, maintaining relationships with key stakeholders, overseeing compliance, and identifying and mitigating investment-related and other type of risks.

### **Non-moderated Variables Implication on Firm Performance**

The results from hypothesis testing described that IT Capability and Enterprise Risk Management have significant influence on Firm Performance. On the other side, Internal Audit and CRO Role have different results where those two variables failed to give positive influence on firm performance. This research found that Internal Audit has no direct effect on Firm Performance. This is not supported by Ismail et al (2008) who found that there is significant influence of IA to firm performance. The unit analysis tested has shown result that the existence or non-existence of Internal Audit has failed to positively affect firm performance. IT has significant influence on Firm Performance, as supported by Na Ranong et al (2009) as the result shows that having good technology in place will enable the companies to drive more effectiveness and efficiency in daily operations. In addition, IT also helps top management to create better informed decisions through big data and data visualization management. CRO has no direct effect to firm performance. This is not supported by Liebenberg and Hoyt (2011) which stated that companies which appointed CROs tend to be more leveraged. However, the result of this study is supported by Beasley et al (2008), which found that CRO appointment determines positive equity market reactions for non-financial firms, but not also for financial firms. Hence, CRO has failed to give significant influence on firm performance on the unit analysis tested.

### **Moderated Variables Implication on Firm Performance**

#### **Internal Audit to Firm Performance**

In this research, it is found that Listed Status has not an insignificant impact when acts as a moderator to see the effect of Internal Audit on Firm Performance. Since SOEs come in various sizes, it will impact on how the enterprise adopts the ERM as the challenges and advantages may vary. Hence, there are many differences of how mature of ERM adoption between one another. For example, large SOEs tend to face more complicated challenges and complexities as they are guided heavily by regulations issued by the market and securities due to the nature of their listed status. This will result in their lack of competitive advantage and agility to shift and make changes faster compare to their non-listed counterparts. Furthermore, this finding does not support to previous research done by Paape and Spekle in 2012. They argued that since listed firms are highly regulated by the government, they tend to have more fully-developed risk management in place. Whereas in this research, it is found that the regulations, which was the enabling factor of ERM adoption in the previous research, becomes one of the several factors which prevent the enterprises from adopting ERM, due to strict regulations in making changes and shifts in their current risk management practices.

#### **IT Capability to Firm Performance**

When moderated by Listed Status, the result shows that IT Capability has a significant influence on Firm Performance. This can be seen from the t count 8.1394 which is greater than T-table 1.96. The large positive coefficient of 1.1863 means that the effect of IT Capability for listed (1) companies results in a higher firm performance value than the effect of IT Capability which is not listed (0). It can also be said that the effect of IT Capability on firm performance for companies that are listed (1) is greater than the effect of IT Capability on firm performance for companies that are not listed (0). This result supports the findings from previous study done by Paape and Spekle (2012) who stated that listed firms are likely to see the positive impact from ERM implementation as they tend to have more fully developed ERM in

place. In this study, it is true that IT Capability has more significant effect on Firm Performance in listed companies, as they tend to have more resources in implementing more advanced IT Capability than non-listed companies. Listed companies would also benefit more from IT Capability because it would enable the companies to have Risk Management Information Systems (RMIS) to detect threats and risks earlier, predict and forecast trends and tendencies in business landscape. Moreover, these listed companies also gained competitive advantage through IT Capability in their risk management practices because IT provides great support in real-time monitoring of office branches which located all over the region and dashboard to generate visualization of key data in order to make better informed decisions for top-management by having more comprehensive perspective and condition of the business. On the other hand, non-listed companies tend to be smaller in size and less complicated in structure than listed companies, hence they see no urgencies in maximizing the utilization of IT Capability, especially in risk management area. Hence, IT Capability has more significant effect on Firm Performance in listed companies than non-listed companies.

### **CRO to Firm Performance**

Based on the research result, it is found that CRO Role has a significant influence on Firm Performance when moderated by Listed Status. This finding supports some parts of the previous study by Liebenberg and Hoyt (2003) which concluded that CRO appointment will have a positive influence on Firm Performance. However, the result shows that the presence of CRO Role has more significant impact on non-listed companies, compare to their listed counterparts. This is emphasized on the negative coefficient is  $-0.8411$  which reflects that CRO will have a significant effect on Firm Performance when interacting with Listed Status, the negative sign shows that the effect of CRO for non-listed companies (0) which results in a higher firm performance value than the effect of listed CROs (1). This further result does not support the findings of Liebenberg and Hoyt (2003) as they argued that listed companies tend to have CRO in place compare to non-listed firms due to their complexity and size. The result shows that CRO role have more significant influence for non-listed companies because they are less complicated in structure and smaller in size, thus having better agility to make changes in risk management practices. Moreover, non-listed companies are not bound to regulations as many as listed companies, giving them more flexibility to adjust and adapt to new approach. Hence, this study does not support the notion that the non-listed firms will less likely seeing the positive impact to firm performance through the performance of CRO than listed firms.

### **ERM to Firm Performance**

Lastly, it is found that ERM positively influences Firm Performance, as supported by Beasley et al (2005), L. Paape (2012), and Ping and Muthuveloo (2015). Beasley et al (2005) has stated that ERM implementation may differ from one industry to another and it is consistently true in this research. In addition, L. Paape (2012) has found out that listed firms are subjected to a special class of regulation, hence noncompliance of the regulation will happen less likely than non-listed firms. Finally, this finding is also consistent with Ping and Muthuveloo (2015) that confirmed the significant influence ERM implementation has on the firm performance. Previous studies argue that listed firms tend to have more organized ERM implementation than non-listed firms. As concluded by Paape and Spekle (2002), this is likely to happen because listed firms will be encouraged to implement ERM as there are regulations which support them to do so and that these regulations will monitor and advise them accordingly so that these firms have more fully-developed risk management systems.

In addition, the findings of OECD survey in 2014 also support the same statement. They found that large SOEs are expected to implement identical risk management practices as it is in listed companies. In other words, they suggested that listed firms tend to have better adoption of ERM.

However, the result of this study shows different outcome from its former research. Listed status function as a moderator between the significant influence of ERM on Firm Performance. This can be seen from the t count  $3.2193$  which is greater than T-table  $1.96$ . The negative coefficient is  $-0.5830$ , which means that the effect of ERM for non-listed companies (0) results in a higher Firm Performance value than the effect of ERM that is listed (1). It can also be said that the effect of ERM on Firm Performance for non-listed companies (0) is greater than the effect of ERM on Firm Performance for companies that are listed (1). Different results are achieved because in this context, listed firms may have more complicated challenges in adopting ERM implementation as they are restricted by the regulations to make any changes or shifts in

their risk management practices, whereas non-listed firms tend to be more flexible and agile in embracing adjustments needed in ERM implementation.

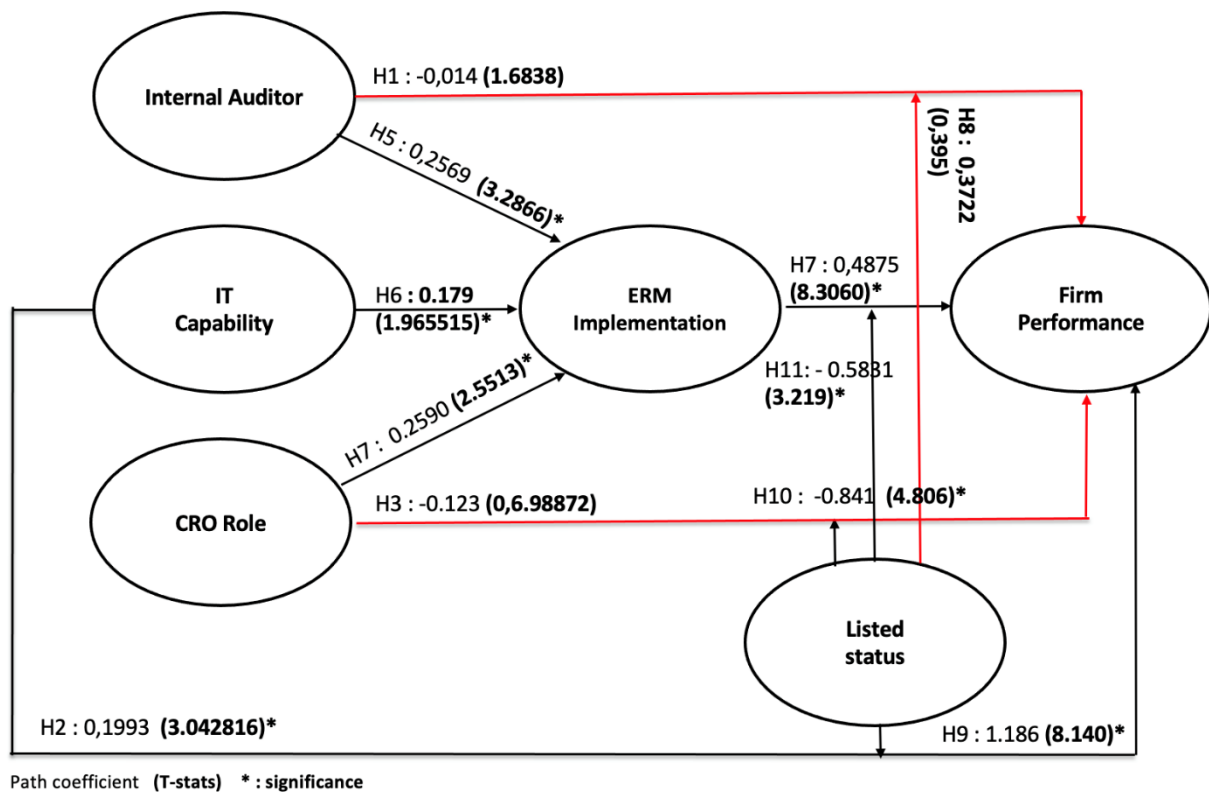


Figure 2. Structural Equation Modelling Result

## VI. DISCUSSION AND CONCLUSION

Risk management is inevitably needed for every organization, especially for commercial enterprises as it functions to manage upcoming and current risks in the organization. However, it is driven better towards the environment with these specific conditions known as VUCA (Volatility, Uncertainty, Complexity, and Ambiguity). As risks have become increasingly complex, usual risk management approaches become obsolete (World Economic Forum, 2018), causing a paradigm shift on how corporation see and manage risk (Lai et al., 2010). This means that managing and mitigating risks have become more important than ever for the management of enterprises nowadays. The management of the enterprises must have a helicopter view in perceiving, analyzing, and assessing risks as it must be regarded from the entire enterprise's perspective (Jie Liu, 2012). Hence, enterprises shifted to Enterprise Risk Management (ERM) which has a more holistic approach to manage risk so that it can be prevented, mitigated, and accepted with minimal loss and damage.

Currently Indonesia has 114 State-Owned-Enterprises (SOEs) which hold important roles for the growth of national economy and citizen's welfare, such as infrastructure development, human resources development, and distribution of essential groceries for the people. Due to the extent of impact and contribution given to people's welfare, SOEs are chosen as the unit analysis in this study. This study discussed about how the implementation of ERM contributes to the performance of the SOEs. In addition, this study is done to examine which variables have the most significant influence against the performance of SOEs. We hope that the findings and results of this study can be beneficial to all stakeholders; to offer new insights on ERM implementation, CRO role, the relationship between Internal Audit (IA) and IT against ERM and company performance.

To achieve the research objectives, we have conducted hypothesis testing with the following conclusions:

1. Internal Audit has no direct effect on Firm Performance. This means that the existence or non-existence of Internal Audit has failed to significantly influence firm performance on the unit analysis tested.
2. Internal Audit positively affects ERM implementation. The existence of Internal Audit has significant influence on the ERM implementation as it encourages proper monitoring. Internal Audit also ensures that there is regular reporting to top management regarding ERM implementation so that it is properly applied.
3. IT Capability positively affects Firm Performance. Improvement in IT capability and investment in the organization has significant influence on firm performance, as IT optimizes and enhances company operations to be more effective and efficient.
4. IT Capability positively affects ERM implementation. The result has shown that IT capability has significant influence on the ERM implementation as it enables the implementation process, in regards to proper monitoring, so that monitoring can be done efficiently in real time. In addition, IT capability also contributes to the support of ERM implementation and provides sufficient data visualization to help top management making better informed decisions regarding the implementation.
5. CRO role positively affects ERM implementation. In this study, it is proven that CRO role has significant influence on the success of ERM implementation. Companies which have CRO in place result in higher ERM maturity level as this means there is a person in charge to get the buy-in from management to apply ERM and execute ERM strategies. This also means that companies which have no CRO role tend to have lower ERM maturity level as there is no proper monitoring and direction in applying ERM practices.
6. CRO has no direct effect on Firm Performance. The existence or nonexistence of CRO has failed to significantly influence firm performance on the unit analysis tested.
7. ERM positively affects Firm Performance. ERM is found to have significant influence on the firm performance, as companies which have higher level on ERM maturity tend to perform better compare to others having lower level on ERM maturity. Having ERM in place prepares companies better in managing and mitigating risks as it provides robust approach in defining and managing risks, especially in this uncertain world.

In conclusion, Internal Audit, IT Capability and CRO Role have positive influence towards on ERM implementation. In addition, when moderated by listed status, the aforementioned variables also have significant influence on Firm Performance. Hence, these three variables have been proven to be useful and that they should be prioritized or enabled in ERM implementation to ensure the success of its reinforcement, particularly in Indonesian SOEs. Furthermore, by understanding which areas need to be improved and the upcoming challenges in implementing them, it will be of great benefit to provide SOEs a thorough guidance on the success of ERM implementation in their companies to optimize their risk management practices.

Based on the findings and implications found in this research, we drew out several beneficial recommendations for the next research, companies, and governments.

### **Recommendations for the next research**

This study has some recommendations which are beneficial to the next research in this topic. The recommendations are as follow:

First, the next research can be done to all 114 State-Owned-Enterprises to examine which sectors have the highest maturity level on ERM implementation. Second, further research can be done by using different unit analysis, for example listed companies in Indonesian Stock Exchange. This can be useful to assess maturity level of ERM implementation in various sectors, to see which sector has the most optimum implementation. Third, in 2015, Financial Services Authority (OJK) has issued regulations regarding risk management implementation in non-bank financial institutions and companies. Some of the companies have just implemented ERM in 2016 which means the implementation has just been applied recently. These companies can be used as the unit analysis in further study regarding ERM implementation to understand which companies successfully applied ERM framework in their companies and whether the said implementation brings influence to their financial performance.

### **Recommendations for the enterprise**



Based on this study, we would like to give the following recommendation for the enterprise: State-Owned-Enterprises or other companies are suggested to apply ERM in their institutions as ERM implementation contributes to better financial performance. IA, IT and CRO have significant influence in ERM implementation on financial performance. It is understandable that implementing ERM may be challenging, hence the findings of this study can be beneficial and acts as a guidance for related stakeholders. Some recommendations made are availability of roadmap to implement ERM, access to framework as a guide to implement ERM, and availability of trained and certified human resources to ensure the success of ERM implementation.

### Recommendations for the government

The followings are the recommendations given to the government:

First, the government should devise specific policies which regulates ERM implementation in all SOEs to improve their financial performance. Second, SOEs are recommended to have ERM implementation roadmap to ensure all SOEs achieved stage 5 of the implementation, which means that ERM has been implemented properly and accordingly. Third, to incentivize SOEs to be more creative and innovative in the implementation of ERM, SOEs are encouraged to participate in ERM Award competition, both nationwide and worldwide. Fourth, one of the key factors influencing the success of ERM implementation is the availability of trained and certified human resources. Therefore, several initiatives to ensure the fulfilment of this factor must be undertaken. Indonesian SOEs are highly expected to be internationally recognized SOEs whether in the perspective of asset, number of customers, and revenue so that they can contribute more in paying taxes and/or dividend to the government, which in turn contribute to the betterment of Indonesian citizen's welfare.

### REFERENCES

- [1] Abdul, M., Kolej, H., & Insaniah, U. (2017). The Effect Of Enterprise Risk Management On Firm Value: Evidence From Malaysian Technology Firms
- [2] Ackermann, C., & Marx, B. (2016), Internal audit risk management in metropolitan municipalities, Risk, Governance and Control: Financial Markets and Institutions, Vol. 6 No. 3, pp. 45-51
- [3] Adejoh Edogbanya., & Hasnah Kamardin (2015). The Relationship Between Audit And Risk Management s On Financial Performance Of Non-Financial Companies In Nigeria: A Conceptual Review. DOI: 10.5901/Mjss.2015.V6n3p206
- [4] Ahmad, S., Chew Ng, Mcmanus, L.A. (2014). Enterprise Risk Management (ERM) Implementation: Some Empirical Evidence From Large Australian Companies. Doi:10.1016/J.Sbspro.2014.11.144
- [5] Ahmad Shukri Yazid, & Wan Norhayate (2011). An Examination Of Enterprise Risk Management (ERM) Practices Among The Government-Linked Companies (Glcs) In Malaysia. Doi:10.5539/Ibr.V4n4p94
- [6] Al-Matari, E.M., A.K. Al-Swidi and B.F.H. Fadzil. (2014). The effect on the relationship between board of directors characteristics on firm performance in Oman: Empirical study. Middle-East Journal of Scientific Research, 21(3): 556-574. V
- [7] Aldamen, H., Duncan, K., Kelly, S., Namara, R.M., & Nagel, S. (2012). Audit Characteristics And Firm Performance During The Global Financial Crisis. Doi: 10.1111/J.1467-629X.2011.00447.X
- [8] Ali Sulieman Alshatti. (2015). The Effect Of Credit Risk Management On Financial Performance Of The Jordanian Commercial Banks.
- [9] Arena, M. & Azzone, G. (2007). Internal Audit Departments: Adoption and Characteristics in Italian Companies. International Journal of Auditing, 11, pp. 91-114.
- [10] Arena, M., Arnaboldi, M., & Azzone, G. (2010). The Organizational Dynamics Of Enterprise Risk Management. <https://doi.org/10.1016/J.Aos.2010.07.003>
- [11] Ballantyne, Ryan (2013). An Empirical Investigation Into The Association Between Enterprise Risk Management And Firm Financial Performance, Lawrence Technological University
- [12] Bass, B. M., Avolio, B. J., Jung, D. I., & Berson, Y. (2003). Predicting unit performance by assessing transformational and transactional leadership. Journal of Applied Psychology, 88(2), 207-218.
- [13] Beasley, M. S., Clune, R., & Hermanson, D.R. (2005). Enterprise Risk Management: An Empirical Analysis Of Factors Associated With The Extent Of Implementation. Doi:10.1016/J.Jaccpubpol.2005.10.001
- [14] Bennett, N. & Lemoine, G. J. (2014). What A Difference A Word Makes: Understanding Threats To Performance In A VUCA World. <http://dx.doi.org/10.1016/J.Bushor.2014.01.001>

- [15] Bertinetti, G., Cavezzali, E., &Gardenal, G. (2013). The Effect of the Enterprise Risk Management Implementation on the Firm Value of European Companies. SSRN Electronic Journal. 10.2139/ssrn.2326195.
- [16] Bhimani. (2009). Risk Management, Corporate Governance And Management Accounting: Emerging Interdependencies, Doi:10.1016/J.Mar.2008.11.002
- [17] Bonazzi, L., & Islam, S. M. N. (2007). Agency Theory And Corporate Governance A Study Of The Effectiveness Of Board In Their Monitoring Of The CEO, 2(1), 7–23. <https://doi.org/10.1108/17465660710733022>
- [18] Bromiley, P., Shane, M.M., Nair, A., &Rustambekov, E. (2014). Enterprise Risk Management: Review, Critique, And Research Directions. <http://dx.doi.org/10.1016/J.Lrp.2014.07.005>
- [19] Chin, W. W. (2003). PLS Graph 3.0. Houston: Soft Modeling Inc.
- [20] Cohen, J. R., Holder-Webb, L. L., Nath, L & Wood, D. (2011). Corporate Reporting Of Nonfinancial Leading Indicators Of Economic Performance And Sustainability, DOI: 10.2308/Acch-50073 2012<sup>1</sup><sub>SEP</sub>;Pp. 65–90
- [21] COSO. (2014). Improving Organizational Performance And Governance,
- [22] Dash, D., Chen, S., & Olson, D. L. (2014). Business Intelligence In Risk Management: Some Recent Progresses. DOI: 10.1016/J.Ins.2013.10.008
- [23] Dickinson, G. (2001). Enterprise Risk Management: Its Origins And Conceptual Foundation.
- [24] Drogalas, G., &Siopi, S. (2017). Risk management and internal audit: Evidence from Greece. Risk governance & control: financial markets & institutions, 7(3), 104-110. <https://doi.org/10.22495/rgcv7i3p10>
- [25] Economist. (2012). State-owned enterprises. The State Advances. China Edition. The Economist Newspaper Limited 2020. <https://www.economist.com/china/2012/10/06/the-state-advances>
- [26] Edogbanya, A. (2015). The Relationship Between Audit And Risk Management s On Financial Performance Of Non-Financial Companies In Nigeria: A Conceptual Review. <https://doi.org/10.5901/Mjss.2015.V6n3p206>
- [27] Eisenhaedt, K.M. (1989). Agency Theory: An Assessment And Review.
- [28] Florio, C., & Leoni, G. (2016). Enterprise Risk Management And Firm Performance: The Italian Case. <https://doi.org/10.1016/J.Bar.2016.08.003>.
- [29] Frigo, M. L & Anderson, R. J. (2011). Strategic Risk Management: A Foundation For Improving Enterprise Risk Management And Governance. DOI 10.1002/Jcaf.20677
- [30] Ferdinand, A. (2006). MetodePenelitianManajemen. Semarang: Badan Penerbit Universitas Diponegoro.
- [31] Gates, S., Nicolas, J.L., Walker P. L. (2012). Enterprise Risk Management: A Process For Enhanced Management And Improved Performance.
- [32] Ghozali, I. (2011). AplikasiAnalisis Multivariate Dengan Program SPSS. Semarang: Badan Penerbit Universitas Diponegoro.
- [33] Gordon, Loeb, M.P., &Chih-Yang T Seng. (2009). Enterprise Risk Management And Firm Performance: A Contingency Perspective. DOI: 10.1016/J.Jaccpubpol.2009.06.006
- [34] Guillot, C. (2013). Avoiding the Void. Internal Auditor, pp. 42-47.
- [35] Gupta, N. (2005). Partial privatization and firm performance. Journal of Finance, 60, 987–1015. <https://doi.org/10.1111/j.1540-6261.2005.00753.x>
- [36] Halliday, S., Badenhorst, K., & Rossouw Von Solms.1996. A Business Approach To Effective Information Technology Risk Analysis And Management. <http://dx.doi.org/10.1108/09685229610114178>
- [37] Hasanali, F. (2002). Critical Success Factors Of Knowledge Management
- [38] 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.
- [39] Hosseini, M. R., Chileshe, N., Jepson, J., &Arashpour, M. (2016). Critical Success Factors For Implementing Risk Management Systems In Developing Countries. DOI: 10.5130/AJCEB.V1i1.4651
- [40] Hoyt, R. E. (2003). The Determinant Of Enterprise Risk Management: Evidence From The Appointment Of Chief Risk Officers. <https://doi.org/10.1111/1098-1616.00019>
- [41] Hoyt, R., & Liebenberg, A., (2006). The value of enterprise risk management: Evidence from the U.S. insurance industry, American Risk and Insurance Association Annual Meeting, USA, Washington D.C. August 6-9, Retrieved from [http://www.aria.org/meetings/2006papers/Hoyt\\_Liebenberg\\_ERM\\_070606.pdf](http://www.aria.org/meetings/2006papers/Hoyt_Liebenberg_ERM_070606.pdf)
- [42] Hoyt, R.E., & Liebenberg, A. P. (2008). The Value Of Enterprise Risk Management: Evidence From The U.S. Insurance Industry.

- [43] Hoyt, R.E., & Liebenberg, A. P. (2011). The Value of Enterprise Risk Management. <http://dx.doi.org/10.1111/j.1539-6975.2011.01413.x>
- [44] Hoyt, R.E., Eckles, D.L., & Miller, S.M. (2014). The Impact Of Enterprise Risk Management On The Marginal Cost Of Reducing Risk: Evidence From The Insurance Industry.
- [45] Hulland, J. (1999). Use of partial least squares (PLS) in strategic management research: a review of four recent studies. *Strategic Management Journal*, 20(2), 195–204.
- [46] Hutchinson, M. R., & Mat Zain, M. (2009). Internal audit quality, audit committee independence, growth opportunities and firm performance. QUT Digital Repository.
- [47] Ismail, H, TakiahMohd. & Iskandar Mohd. MohidRahmat. (2008). Corporate Reporting Quality, Audit <sup>11</sup> <sub>SEP</sub> And Quality Of Audit
- [48] Jedynek, Piotr., & BaK, Sylwia. (2018). The Global Risk Landscape. Its Shape, Tendencies, And Consequences For Management. Doi: 10.22367/Jem.2018.32.04
- [49] Jensen, M.C., & Meckling, W.H. (1976). Theory Of The Firm : Managerial Behaviour, Agency Costs And Ownership Structure.
- [50] Jihe, S., & Brian, W. (2004). Benchmarking Audit Effectiveness In Financial Reporting
- [51] Karaca, S. (N.D.). The Effect Of Enterprise Risk Management On Firm Performance: A Case Study On Turkey.
- [52] Karanja, E., & Rosso, M.A. (2017). The Chief Risk Officer: a study of roles and responsibilities. *Risk Management* 19, 103–130.
- [53] Kleffner, A. E., Lee, R. B. & McGannon, B. (2003). The Effect Of Corporate Governance On The Use Of Enterprise Risk Management: Evidence From Canada, <https://doi.org/10.1111/1098-1616.00020>
- [54] Kline, R. B. (2005). *Methodology in the social sciences. Principles and practice of structural equation modeling* (2nd ed.). Guilford Press.
- [55] Kommunuri, J., Narayan, A., Wheaton, M., & Jandug, L. (2009). Enterprise Risk Management And Firm Performance Empirical Evidence From Vietnam.
- [56] L. De Zwan (2011). Internal Audit Involvement In Enterprise Risk Management. <https://doi.org/10.1108/02686901111151323>
- [57] Lai, Chi-Shiun., Chiu, Chih-Jen., Yang, Chin-Fang., & Pai, Da-Chang. (2010). The Effects of Corporate Social Responsibility on Brand Performance: The Mediating Effect of Industrial Brand Equity and Corporate Reputation. *Journal of Business Ethics*. 95. 457-469. 10.1007/s10551-010-0433-1.
- [58] Lai, F. (2011). Enterprise Risk Management Framework And The Empirical Determinants Of Its Implementation.
- [59] Lassar, W. M., & Kerr, J. L. (1996). Strategy And Control In Supplier-Distributor Relationship: An Agency Perspective. Doi:10.1002/(Sici)1097- 0266(199610)17B8<613::Aid- Smj836>3.0.Co;2-B
- [60] Lukianchuk, G. (2015). The Impact Of Enterprise Risk Management On Firm Performance, 11(13).
- [61] Manurung, A. H., & Budiastuti, D. (2019). Metode Riset Akuntansi, Investasi Keuangan dan Manajemen. In Jakarta (ID). PT Adler Manurung.
- [62] Manurung, A.H., (2019). Model dan Estimasi dalam Riset Manajemen dan Keuangan. Jakarta: PT. Adler Manurung Press.
- [63] Martin F, Grace J, Leverty, T., Phillips, R.D., & Shimpi, P. (2014). The Value Of Investing In Enterprise Risk Management. DOI: 10.1111/Jori.12022
- [64] Martin, M. (2015). Determinants And Value Of Enterprise Risk Management: Empirical Evidence From Literature. <https://doi.org/10.1111/Rmir.12028>
- [65] Mashal, R. (2012). Internal Audit Roles in Risk Management from Risk Management Perspective: New Vision. 10.13140/2.1.3402.3366.
- [66] Mccolgan, P. (2001). Agency Theory And Corporate Governance: A Review Of The Literature From A UK Perspective.
- [67] Miller, K. D. (1991). A Framework For Integrated Risk Management In International Business.
- [68] Mpakaniye, J. P. (2017). The Effect of Internal Audit on Budget Process and Execution of Local Government of Rwanda. <http://dx.doi.org/10.2139/ssrn.3051577>
- [69] Mutsaers E.J., Han Van Der Zee, Giertz, H. (1998). The Evolution Of Information Technology
- [70] Norhayate, W., Daud, W., Iman, U. D., Yazid, A. S., Iman, U. D., Mohd, H., & Hussin, R. (2010). The Effect Of Chief Risk Officer (CRO) On Enterprise Risk Management (ERM) Practices: Evidence From Malaysia. DOI: 10.19030/Iber.V9i11.30
- [71] Paape, L., & Speklé, R. F. (2012). The adoption and design of enterprise risk management practices: An empirical study, *European Accounting Review*, 21(3), 533-564. doi:10.1080/09638180.2012.661937

- [72] Pagach, S Warr., & Richard.(2007). An Empirical Investigation Of The Characteristics Of Firms Hiring Chief Risk Officers
- [73] Pagach, S Warr. (2010). The Effects of Enterprise Risk Management on Firm Performance. DOI: 10.2139/ssrn.1155218
- [74] Peng, Mike W. (2016). Theories of the (state-owned) firm. *Asia Pacific Journal of Management*. DOI: 10.1007/s10490-016-9462-3
- [75] Philips, R.D, Cummins, J.D, &Smith,S.D. (1997). Derivatives And Corporate Risk Management: Participation And Volume Decisions In The Insurance Industry. [Http://Dx.Doi.Org/10.2139/Ssrn.2561945](http://Dx.Doi.Org/10.2139/Ssrn.2561945)
- [76] Ping, T. A., &Muthuveloo, R. (2015). The Impact Of Enterprise Risk Management On Firm Performance: Evidence From Malaysia. [Https://Doi.Org/10.5539/Ass.V11n22p149](https://Doi.Org/10.5539/Ass.V11n22p149)
- [77] Quon, T. K., Zeghal, D., &Maingot, M. (2012). Enterprise Risk Management And Firm Performance. [Https://Doi.Org/10.1016/J.Sbspro.2012.09.042](https://Doi.Org/10.1016/J.Sbspro.2012.09.042)
- [78] Ranong, Prapawadee Na., &Phuengam, Wariya. (2009). Critical Success Factors For Effective Risk Management Procedures In Financial Industries: A Study From The Perspectives Of The Financial Institutions In Thailand
- [79] Razali, A. R., & Tahir, I. M. (2011). Review Of The Literature On Enterprise Risk Management.
- [80] Rehman, A.A. (2012). Qualitative Research In Financial Markets. [Http://Dx.Doi.Org/10.1108/17554171211252501](http://Dx.Doi.Org/10.1108/17554171211252501)
- [81] Rolland, H. (2008). Using IT to drive effective risk management. *Risk Management*, 55(1), 43.
- [82] Samphantharak, K. (2019). State Owned Enterprises in Southeast Asia. Forthcoming, *Economic Development of Southeast Asia (2019)* MIT Press, Available at SSRN: <https://ssrn.com/abstract=3388390>
- [83] Sarens, G. & De Beelde, I. &Everaert, P. (2009). Internal audit: a comfort provider to the Audit Committee. *The British Accounting Review*. 41. 90-106. 10.1016/j.bar.2009.02.002.
- [84] Schumacker, R. E., & Lomax, R. G. (2016). A beginner's guide to structural equation modeling.
- [85] Shad, M. K. F.-W. L. (2015). Enterprise Risk Management And Firm Performance Validated Through Economic Value Added Factors.
- [86] Shin, Yongheol., &Pesran, Hashem. (1999). An Autoregressive Distributed Lag Modelling Approach To Cointegration Analysis In Econometrics And Economic Theory In The 20th Century: The Ragnar Frisch Centennial Symposium
- [87] Singhvi, S.S., & H. B. Desai. (1971). An Empirical Analysis of the Quality of Corporate Financial Disclosure. *The Accounting Review*, 46(1):129-138.
- [88] Sohnke M. Bartram. (2000). Corporate Risk Management As A Lever For Shareholder Value Creation
- [89] Soliman, A.M., & Mukhtar. A. (2017). "The long-term relationship between enterprise risk management and bank performance: the missing link in Nigeria". [http://dx.doi.org/10.21511/bbs.13\(1\).2018.12](http://dx.doi.org/10.21511/bbs.13(1).2018.12)
- [90] Soltanizadeh, et al. (2016). Business Strategy, Enterprise Risk Management And Organizational Performance. [Https://Doi.Org/10.1108/MRR-05-2015-0107](https://Doi.Org/10.1108/MRR-05-2015-0107)
- [91] Soltanizadeh, S., Zaleha, S., Rasid, A., Golshan, N., &Quoquab, F. (2014). Enterprise Risk Management Practices Among Malaysian Firms. [Https://Doi.Org/10.1016/J.Sbspro.2014.11.084](https://Doi.Org/10.1016/J.Sbspro.2014.11.084)
- [92] Sosik, J. J., Kahai, S. S., &Piovosio, M. J. (2009). Silver bullet or voodoo statistics? A primer for using partial least squares data analytic technique in group and organization research. *Group & Organization Management*, 34(1), 5-36.
- [93] Sprčić, M., Kožul, A., &Pecina, E. (2015). State And Perspectives Of Enterprise Risk Management System Development - The Case Of Croatian Companies, 30(15), 768-779. [Https://Doi.Org/10.1016/S2212-5671\(15\)01326-X](https://Doi.Org/10.1016/S2212-5671(15)01326-X)
- [94] Sugiyono, 2009, *Metode Penelitian Kuantitatif, Kualitatif dan R&D*, Bandung: Alfabeta.
- [95] TseYiuman, A. K. T. (2016). Risk Management And Firm Value: Recent Theory And Evidence. [Https://Doi.Org/10.1108/IJAIM-05-2015-0027](https://Doi.Org/10.1108/IJAIM-05-2015-0027)
- [96] Warren, R., J. Price, A. Fischlin, S. de la Nava Santos, & G. Midgley. (2011). Increasing impacts of climate change upon ecosystems with increasing global mean temperature rise. *Climatic Change*, 106(2), 141-177
- [97] Wong, K. Y. (2005). "Critical success factors for implementing knowledge management in small and medium enterprises", *Industrial Management & Data Systems*, Vol. 105 Issue: 3, pp.261-279, <https://doi.org/10.1108/02635570510590101>

- [98] Wong, K. K. (2011). Review of the book *Handbook of Partial Least Squares: Concepts, Methods and Applications*, by V. Esposito Vinzi, W.W. Chin, J. Henseler & H. Wang (Eds). *International Journal of Business Science & Applied Management*. 6 (2), 52-54.
- [99] Wong, Ken. (2013). Partial least square structural equation modeling (PLS-SEM) techniques using SmartPLS. *Marketing Bulletin*. 24. 1-32.
- [100] Wu, D & Olson, D & Birge, J. (2013). Risk management in cleaner production. *Journal of Cleaner Production*. 53. 1-6. 10.1016/j.jclepro.2013.02.014.
- [101] Xenomorph (2007), "A Platform for Effective Risk Management Increasing market risk managers' effectiveness." *Xenomorph Transforming Data Management*.
- [102] Yegon, Christopher K., Mouni, Jeffrey Gekara., & Wanjau, Kenneth. (2014). Effects Of Firm Size On Enterprise Risk Management Of Listed Firms In Kenya. DOI: 10.9790/487X-16548695
- [103] Yim, K & Nahm, F & Han, K. (2010). Analysis of Statistical Methods and Errors in the Articles Published in the Korean Journal of Pain. *The Korean journal of pain*. 23. 35-41. 10.3344/kjp.2010.23.1.35.
- [104] Zaleha, S., Rasid, A., Golshan, N. M., Khairuzzaman, W., & Ismail, W. (2012). Performance Measurement And Organizational Performance: A Conceptual Framework, (March). DOI: 10.1016/J.Sbspro.2014.09.089