

# Modeling firm resources – enterprise risk management relationships

ERM  
relationships

## An empirical finding using PLS-SEM

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### Abstract

**Purpose** – The purpose of this paper is to focus, explore, and provide an in-depth analysis of the relationship between company resources and the process of enterprise risk management (ERM) in order to strengthen corporate structures against emerging uncertainties.

**Design/methodology/approach** – This paper proposes a strategic risk management framework for the development and sustainability of corporate performance by focussing on the dimension of firm resources extracted from the resources-based theory. This paper focussed on using Malaysia listed firms under Malaysian Bourse as sample frame using the random sampling technique whereby questionnaire were distributed among head of risk management department. Of the 600 questionnaires distributed, 223 were returned completed.

**Findings** – The survey results indicate that intangible resources play a significant roles in resources – performance relationship while the other two main dimension that are tangible resources and capabilities have shown contradictory results.

**Research limitations/implications** – This paper only focussed on using Malaysia listed firms under Malaysian Bourse as sample frame.

**Practical implications** – The management of risk is a dynamic phenomenon and the change of management that parallel with its evolution demand a revisiting and revamping over and over again promptly. In order to adapt and survive the volatile environment time and again, the effort to ensure long-term sustainability has to be made by the firm as success and failure can quickly replace one another in a relatively short period. The results highlight the various insight that might be helpful to managers in terms of managing the performance of the firm by concentrating entirely on its risk management and resources managements process.

**Originality/value** – Overall it was shown that only certain dimension of resources within the firm has strong relationship with the performance variation. As such, the company has to ensure that deployment of resources has to be optimized accordingly by focussing on the types of resources that matters so that possibility of improving the outcome of the firm in the volatile global environment can be realized.

**Keywords** Performance, Cross-disciplinary, Management, Strategy, Globalization, Organization

**Paper type** Research paper



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## Introduction

Vulnerability within corporate financial structures, perceived to be the main factors contributing to the crisis in late 1990s, actually existed since early 1990s. Since the 1990s, international financial losses have continued, one by one. These include the collapse of Barings Bank in 1995, the Asian financial crisis in 1997 and 1998, and the most recent global crisis in 2008 and 2009. Developing countries like Malaysia must take notice and concentrate more on the significance of the corporate sector, its important linkage with the financial sector and its impact on the economy generally. Although the financial fragility of the corporate sector during the 1990s may not have triggered the crisis, it did contribute to its depth and severity. An alternative measure to financial fragility would be to use financial data to scrutinize financial risks in the corporate sector. This is limited, however, due to scarcity of data and would be complicated to identify risk factors and its relations.

Economy of Malaysia subjected to three sub-periods of major shocks, i.e. economic downturn in 1980 in developed countries triggered by the US high interest rate policy (the "Volker" Shock) resulted in a massive collapse of world commodity trade. Between 1984 and 1986, Malaysia's overall export price index declined by 30 percent reflecting a sharp drop in tin and palm oil prices. The collapse caused problems for the new industries most of which had just begun production such as HICOM which suffered a total operation loss of US100 million in 1986/1987 an increase of 71 percent over the previous year. Asian financial crisis 1997 which involve most of Asia country including Malaysia originated from Thailand. Malaysia construction sector declined by 23.5 percent; manufacturing decreased by 9 percent and agriculture sector by 5.9 percent. Overall Malaysia GDP fell 6.2 percent in 1998. A large number of PLCs were unable to regulate their financial affairs and were delisted. Although the magnitude of collapse in Global Crisis 2008 (share prices fell by 20 percent between 2007 and 2009) not as severe as collapse in 1997 crisis (share prices collapse by 53 percent between 1996 and 1998), but it send obvious signals to the respective parties to start finding a resilient ways to withstand any major shock in the near future.

Dafikpaku (2011) emphasized that the current competitive business environment makes business entities face greater uncertainties (risks and opportunities) as they strive to create value. Due to the current global economic crisis, businesses, in a bid to stay competitive, have taken several crucial measures. Feeding a strong risk culture within an organization is crucial to ensure that the corporate sector is not repeatedly being faced with such vulnerability.

An earlier study by Claessens *et al.* (1998) found that East Asian financial crisis had partly attributed to the weak performance and risky financial structures of the firm itself specifically the misallocation of resources. Findings from their study are further supported by Poon (1999) explicitly to Malaysian financial and economic condition. The result shows that the misallocation and inefficient handling of firm resources that already existed before the crisis were essential factors in the failing performance of the corporate sector. Harvey and Roper (1999) emphasized the same verification for this observation. The logic behind the statement presumed that before the crisis, firms with already frail condition functioning with a high degree of risk were not being controlled adequately. Previous findings conclude that firm-specific weaknesses that already exist before the crisis were essential factors in the failing performance of the corporate sector during the crisis, especially in the late 1990s. The logic behind the statement presumed that before the crisis, firms with already frail condition functioning with a high degree of risk were not being controlled adequately especially in terms of its allocation of

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resources. Considering the significant impact that the 1997 Asian financial crisis and recent global economic crisis had on Malaysia's real economy, it is important to ask why the crisis occurred and how/if such an event can be avoided in the future.

The various events occurred had given rise to the proliferation of different frameworks in risk management. Firms also have to improve its allocation of resources to align with the process of ERM within the organization to be effective. Academic literature on enterprise risk management (ERM) has focussed more on level of adoption of ERM practice within a firm and its determinants (which apparently falls on various types of resources such as cash, fixed asset, skills workers, etc.) but it is unclear which of the resources within a firm that actually play pivotal roles in the implementation of the practice (Paape and Spekle, 2012). The same views have also been supported by the most current studies like Monda and Giorgino (2013).

### **ERM – conceptualization and framework**

It was disputed that the term ERM has quite parallel meaning with corporate risk management, enterprise-wide risk management, holistic risk management, integrated risk management, business risk management, and strategic risk management (Kleffner *et al.*, 2003; D'Arcy and Brogan, 2001; Manab *et al.*, 2010; Liebenberg and Hoyt, 2003, 2011; Daud and Yazid, 2009). Casualty Actuarial Society (CAS, 2003) defines ERM as disciplines by which an organization in any industry assesses, controls, exploits, finances, and monitors risks from all sources for the purposes of increasing the organization's short- and long-term value to its stakeholders. Meagher and O'Neil (2000) on the other hand, described it as a structured and disciplined approach in aligning strategy, processes, people, technology, and knowledge with a purpose of evaluating and managing the uncertainties the enterprise faces as it creates value.

There are many definitions for ERM, but a standard definition is that developed by the Committee of Sponsoring Organizations of the Treadway Commission (COSO). In 2004 COSO published, "Enterprise Risk Management – Integrated Framework" (COSO-ERM). COSO-ERM offers the following definition for ERM:

Enterprise risk management 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.

The increasing interest in ERM started since the 1990s where several corporate disasters occurred globally (Mikes and Kaplan, 2013). A study conducted by Mikes and Kaplan (2013), found that economic crisis that involved corporate sector globally is enabled by poor risk management of the companies and regulators. Since the 1990s, international financial casualties have emerged one by one: the bankruptcy of Barings Bank in 1995, the Asia financial crisis in 1997 and 1998 and most recent a global crisis in 2008 and 2009. The various events occurred had given rise to the proliferation of different frameworks in risk management.

Milestones of the effort include the Turnbull report in the UK (its requirements for risk disclosure incorporated directly into stock exchange listing rules) which Malaysia has adopted into their stock exchange listing rules as well, The COSO Enterprise Risk Management Framework in the USA, ISO 31000: 2009 – Principles and Guidelines on Implementation by the International Organization for Standardization and Australia/New Zealand AS/NZ4360 2004 framework to name a few. In various

literature, the term ERM has a variety of different definitions (British Standard BS31100), however, the operational definition of the COSO in 2004, Australia/New Zealand (AS/NZ 4360 2004), CAS in 2003 and several other established association commonly adopted by various empirical findings such as Beasley *et al.* (2005, 2006) and many others.

However, Beasley *et al.* (2010) as cited in Lundqvist (2014) find that the COSO ERM framework, one of the most cited and debated frameworks, is considered to be ambiguous and overly theoretical in nature by individuals who are involved in leading ERM. As such, another framework that provide alternatives within this study context comes from AS/NZS 4360:2004 which defined risk management as an adaptable process that has to addresses all types of risk throughout the organization and industries. The AS/NZ 4360 emphasized the establishment of a context for risk management – external as well as an internal factor and grasps the opportunity side of risk management by emphasizing value creation and preservation. It has also formed the basis of ISO 31000. ISO 31000 builds on the AS/NZS 4360 principle that striving toward business goals always carries an element of risk and uncertainty. The definition of risk management by ISO 31000 which is also an adaptation of AS/NZS 4360 2004 has been quoted as “coordinated activities to direct and control an organization concerning risk,” (i.e. culture, processes, structures).

The most recent study of Mikes and Kaplan (2013) emphasized in their studies that standards and guidelines by ISO 31000 more suited and applicable to all types of risks and generally fit to be adopt by all organizations. The most recent study of Mikes and Kaplan (2013) emphasized in their studies that standards and guidelines by ISO 31000 more suited and applicable to all types of risks and generally fit to be adopt by all organizations. The recent study conclusion is congruent with the sample of firms for this study that comes from various industries and sector. Therefore, this research follows Mikes and Kaplan (2013) approach and adopt the framework by ISO 31000 2009 which instrument were adopted from Australia/New Zealand AS/VZ4360 2004 framework specifically on the dimension and instrument for perceived effective ERM. Furthermore, Ismail *et al.* (2012) also found that that the by ISO 31000 2009 is the most practice framework among corporate sector in Malaysia.

There are several issues with regards to the definition of effective ERM. Harvey defined effectiveness as the degree to which an activity within an organization fulfills its intended objective or function. According to COSO (2004), an organization is considered to have achieved effective ERM if they met all the eight components of the ERM Framework, respectively internal environment, objective settings, event. Identification, risk assessment, risk response, control activities, information and communication, and risk monitoring, corresponding to the organization’s capability and suitability. Hagigi and Sivakumar (2009) further stressed that effective risk management is not only concerned with the ability of organizations to reduce risk or avoid risk but also the ability to develop suitable risk strategy to the organization’s goals and risk preference. One of the essential qualities required for ensuring effective ERM is to incorporate firm resources factors like skills and capabilities into risk management (Knight, 2007; Warriar and Chandrashekar, 2007; Harb, 2009 and ISO 31000, 2009)

### **Firm resources**

Previous financial studies have not yet come to an ultimate conclusion as to which dimension of firm resources that influence firm performance during any state of the

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economy (Rumelt, 1991). Hall (1992) is one of few studies that explicitly defined and specify explicit dimension on firm resources. He postulates that resources of the company can be divided into two: tangible and intangible resources (IR) that the latter can be categorized into assets and skills (capabilities). The theory of the resource-based (RBT) states that sustainability of a firm is determined by its resources, also known as firm specific. Galbreath (2005) study is one of many who adopted Hall's (1992) approach and classified the IR in his study as such while the dimension for tangible resources (TR) comes from many noted authors within the field such as Hall (1992) and Grant (1991). Hence, this research follows the dimension of firm resources postulates by Grant (1991), Hall (1992), Fahy (2002), Galbreath (2005), and Galbreath and Galvin (2008).

There is various literature that engaged firm-specific resources and firm-specific risks. It might sound that two different terms being put together within the firm but resources and risks are two items that directly and indirectly linked and have to be aligned in order to ensure the deployment of resources within a firm can formulate the best of strategies that will lead to superior performance through the effectiveness of ERM. Various empirical finding that is using primary data and secondary data relates to the risk profiles and risk preferences of firms mostly dependable on its resources characteristic. Beasley *et al.* (2005) found that the skills and know-how of senior management team such as chief risk officer have a positive relationship toward implementation and effectiveness of ERM. Similarly, the tangible feature of the company like the size and financial leverage also influence the adoption and efficiency of ERM deployment. Despite lower rates of respondent at only 10.3 percent, the finding provides an initial exploratory empirical evidence that highlights organizational characteristics or known as firm specific or resources associated with the entity's extent of ERM deployment. A further study was done by Hoyt and Liebenberg (2011) also have the same conclusion with their previous study in 2005.

The finding also consistent with the finding Liebenberg and Hoyt (2003) and Kleffner *et al.* (2003) which also emphasized on the skills of senior management such as chief risk officer as risk champion that can lead the firm toward perceived effectiveness of the ERM practices within the firm. Both previous study parallel with a study by Colquitt *et al.* (1999) which provided evidence that firm-specific characteristics such as industry, size, and background of the individual skills and know-how were responsible for risk management affected the utilization of ERM techniques which leads to the perceived effectiveness of ERM. Despite a various number of previous studies support the relationship between firm specific and ERM practice, there is also some previous literature that did not come to the same conclusion. For example, Pagach and Warr (2010) posit that the relation between financial leverage of the firm did not have a clear relationship with ERM. On the other hand, their findings concluded that the opacity of a firm's assets mainly intangible assets have a positive correlation with ERM. This empirical evidence also supported by Woods (2009) findings that also concluded that intangible asset plays a significant role in the perceived effectiveness of ERM. Paape and Spekle (2012) also similarly emphasized that internal factor of the firm indeed influence the perceived effectiveness of ERM practice that is consistent with the study by Woods (2009). Yazid *et al.* (2008) confirmed that larger companies were more prone toward practicing ERM. Hoyt and Liebenberg (2011) supported this view and revealed in their study that size of the firm is one of the major influences that establish the commitment toward ERM.

In summary, prior literature have shown that the lack of corporate knowledge in resources allocation of the firm and the absence of risk management practice has been a

root problem during the various economic crisis that influence our corporate sector significantly. Hence, this research intends to explore the impact of firm resources – ERM relationship by adopting the RBT as the basic underlying theory for the research framework. Greater understanding of the collective impact of the three dimensions of firm resources on ERM practices should enable it to withstand economic crises in today's global marketplace. Such resiliency is mandatory if Malaysian firms are to consistently foster the country's economic competitiveness and structural wellbeing.

Pagach and Warr (2007) and Yazid *et al.* (2008) also stressed the significance of possessing sufficient resources to adopt an ERM program in the firm. It should keep an organization focussed on the things that drive success as well as provide the tools that can effectively measure organizational execution (Lai *et al.*, 2012). As such, the formulation of the following hypotheses should be read as:

*H1.* TR have significant impact on the perceived effectiveness of ERM.

*H2.* IR have significant impact on the perceived effectiveness of ERM.

*H3.* Capabilities have significant impact on the perceived effectiveness of ERM.

A quantitative approach is employed to achieve the objectives of the study. A survey technique is used to collect data from Chief Risk Officers, or managers risk management departments in Malaysian listed firms across various industries. In total, 223 responses were received and further analyzed. The research models and proposed hypotheses were assessed using the Partial Least Squares (PLS) technique.

There are various literatures that engaged the ideas of firm-specific resources and firm-specific risks. It may seem that two different terms were being put together within the firm. However, resources and risks are two items that are directly and indirectly linked and must be aligned in order to ensure the deployment of resources within a firm can formulate the best of strategies that will lead to superior performance. Liebenberg and Hoyt (2003) concurred that ERM enables firms to segregate benefit from an integrated approach of resources in managing risk that shifts the focus of the risk management function from primarily defensive to increasingly offensive and strategic. In comparison to the old silo-approach of risk management, ERM proponents argue that an integrated approach of risk management increases firm value by reducing inefficiencies inherent in the traditional approach.

### **Methodology**

Unit of analysis for this research is the public listed companies in Malaysia. The population for this research were the 922 public listed companies in Malaysia. This study employs the use of random alphabetical listing selection of listed companies in the 2013 Bourse Listed Companies. The companies must fulfill two criteria to be selected. They must be Malaysian-based listed companies under the Malaysian Bourse and the questionnaire must be filled in by the Person-In-Charge of the respective risk management department/unit of the company. This latter requirement ensures that answers provided validly gauge the relationship between dimension of firm resources and the practice of ERM.

This study follows Ghazali and Manab (2013), which used the same types of sampling but with an exclusion of PN17 and GN3 companies, i.e. the total population of 931 companies with a sample of 250 companies to be used in this study. This study used the PLS-SEM approach with SMARTPLS M3 V2 software. In addition, the research model for this study deals with a large number of indicators for certain variables, namely ERM with 25 indicators per variable. Hence, the PLS-SEM is best

suiting for this research. In the research model, TR, IR and capabilities (CAP) were hypothesized as independent variables and conceptualized as a reflective measurement model. ERM was hypothesized as a reflective measurement model as well.

### Proposed research framework

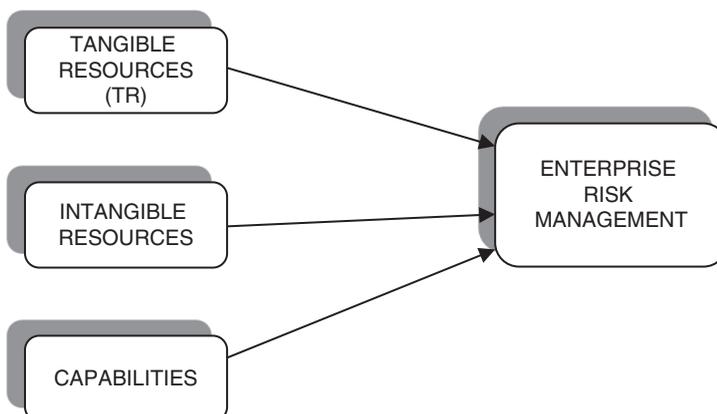
The following framework was developed to help postulate and test the relationship and thus enhance understanding of the situation involved. The proposed framework for the research is shown in Figure 1.

From the above framework, this study suggests that there are significant relationships between the three variable constructs of firm resources as per above toward ERM practice.

### Results analysis

The total number of valid responses entered in the data file were 223 (28 paper-based instruments and 195 online response instruments using Survey Monkey). Only eight survey instruments were incomplete therefore discarded. There were no missing values in any of the responses. This can be attributed to the overall design of the survey instrument, as it was mandatory to respond to all items of the survey. In addition, the paper-based responses and online responses were checked upon receipt for completeness. Although a sample size of 250 companies was targeted, a slightly lesser amount of 223 companies responded to the survey. As the companies were from a wide range of industrial groups, variation in the samples shows the overall industries represented the population of public listed companies under Malaysian Bourse. The rule of thumb of 30 percent is an acceptable response rate level (Sekaran, 2013) hence, the 223 responses were deemed usable for further analysis. From the total responses received, eight were discarded because there were either too many missing values or no variation in the responses at all. The final response rate was 34.30 percent.

The data were also investigated for potential common method bias. This study adopted Harman's one factor test as used by previous studies (Koh and Kim, 2003; Shen *et al.*, 2010). The results for this study showed that the largest variance explained by an individual factor was 39.2 percent. This indicates that neither a single factor nor a general factor accounts for the majority of the covariance in the measures.



**Figure 1.**  
Proposed research  
framework

According to Hair *et al.*, normality is the most fundamental assumption in multivariate analysis and a large variation from the normal distribution indicates statistically invalid results. The statistic analysis on skewness and kurtosis provides verification on the normality of the data. Results of the analysis showed conformity of the data toward normality as the statistical  $z$ -values for skewness and kurtosis were within the span of  $\pm 1.96$ . Statistical values of skewness of less than 3 and kurtosis of less than 10 indicates a normal distribution (Razali and Wah, 2011; Kline, 2011). All the variables in this study were approximately normally distributed with TR skewness of 0.051 (SE-0.163) and a kurtosis of -0.617 (SE-0.324), IR skewness of 0.136 (SE-0.163) and a kurtosis of -0.902 (SE-0.324), capabilities skewness of -0.211 (SE-0.163) and a kurtosis of -0.678 (SE-0.324), ERM skewness of -0.102 (SE-0.163) and a kurtosis of -1.080 (SE-0.324).

### Assessment of measurement model

Measurement models are assessed against the following aspects: indicator reliability, internal consistency reliability, convergent validity, and discriminant validity. Table I lists the various assessment aspects for reflective measurement models.

Convergent validity is assessed by a measure called average variance extracted (AVE), introduced by Fornell and Larcker (1981). AVE values should be above 0.5 to demonstrate an acceptable degree of convergent validity. Convergent validity is adequate when constructs have an AVE value of at least 0.50 or more. All item loadings were greater than 0.50 and significant at the 0.01 level, indicating convergent validity at the indicator level. All AVE values were greater than 0.50, suggesting convergent validity at the construct level. Prior literature suggests the use of "Composite Reliability" as a replacement for Cronbach's  $\alpha$  (Bagozzi and Yi, 1988; Hair *et al.*, 2012). A measurement model has satisfactory internal consistency reliability when the composite reliability (CR) of each construct exceeds the threshold value of 0.7. Table I shows that the CR of each construct for this study ranged from 0.71 to 0.98 and this is above the recommended threshold value of 0.7. All CR values that are greater than 0.70 indicate an acceptable reliability. Thus, the results indicate that the items used to represent the constructs have satisfactory internal consistency reliability. The measurement model's convergent validity is assessed by examining its AVE value. Convergent validity refers to the degree to which indicators that reflect a construct converge in comparison to items measuring other constructs (Urbach and Ahlemann, 2010). Table I shows that all constructs have AVE ranging from 0.528 to 0.644, which exceeded the recommended threshold value of 0.5. This result shows that the study's measurement model has adequate convergent validity.

Next, to determine the assessment of measurement model's discriminant validity, the AVE value of each construct is generated using the SmartPLS algorithm function. Then the square roots of AVE were calculated manually. Based on the results, all square roots of AVE exceeded the off-diagonal elements in their corresponding row and column. The bolded elements in Table II represent the square roots of the AVE and non-bolded values represent the intercorrelation value between constructs. Based on Table II, all off-diagonal elements are lower than square roots of AVE (italic on the diagonal). Hence, the result confirmed that the Fornell and Larcker's criterion is met, indicating adequate discriminant validity for all of the reflective constructs.

### Assessment of structural model

The next step after validating the measurement models is to examine the structural model. There are two aspects in assessing the structural model of SEMs: explanatory

Latent variable	Indicators	Loadings	Significant of the loading ( <i>t</i> -value)	Composite reliability	AVE
Tangible resources	TR3	0.725	3.015**	0.81	0.596
	TR4	0.577	2.496**		
	TR5	0.963	2.702**		
Intangible resources	IR1	0.707	14.557**	0.87	0.528
	IR2	0.808	22.889**		
	IR4	0.758	17.913**		
	IR5	0.749	13.206**		
	IR7	0.600	8.597**		
	IR9	0.718	11.442**		
Capabilities	CAP2	0.7093	2.736**	0.71	0.554
	CAP3	0.7778	3.525**		
Enterprise risk management	ERM1	0.686	19.465**	0.98	0.644
	ERM2	0.821	40.422**		
	ERM3	0.821	36.644**		
	ERM4	0.756	26.680**		
	ERM5	0.779	25.150**		
	ERM6	0.801	32.642**		
	ERM7	0.784	24.514**		
	ERM8	0.761	24.091**		
	ERM9	0.804	35.727**		
	ERM10	0.831	41.100**		
	ERM11	0.835	40.516**		
	ERM12	0.862	51.308**		
	ERM13	0.836	39.887**		
	ERM14	0.791	26.769**		
	ERM15	0.834	40.031**		
	ERM16	0.819	34.461**		
	ERM17	0.875	49.422**		
	ERM18	0.8654	44.632**		
	ERM19	0.7577	21.343**		
	ERM20	0.7546	24.424**		
	ERM21	0.7721	26.804**		
	ERM22	0.7784	28.325**		
	ERM23	0.8296	32.144**		
	ERM24	0.8205	32.947**		
	ERM25	0.7555	21.800**		

**Table I.** Indicator reliability, composite reliability (CR), and average variance extracted (AVE)

Notes: \**t*-values > 1.645 (*p* < 0.05); \*\**t*-values > 2.33 (*p* < 0.01) (one-tailed test)

Latent variable	Capabilities	ERM	Intangible resources	Tangible resources
Capabilities	0.692			
ERM	0.158	0.803		
Intangible resources	0.498	0.363	0.722	
Tangible resources	0.401	0.210	0.488	0.739

**Table II.** Inter-construct correlation

power and predictive power. Explanatory power is assessed against two criteria: coefficient of determination ( $R^2$ ) and effect size ( $f^2$ ). On the other hand, predictive power is assessed against three criteria: path coefficient ( $\beta$ ), predictive relevance ( $Q^2$ ), and relative impact ( $q^2$ ).

*Explanatory power*

According to Cohen (1988),  $R^2$  values around 0.260 are considered substantial while values of approximately 0.130 are deemed average and values of 0.02 or lower are considered weak. In general,  $R^2$  values have to be sufficiently high to have a minimum level of explanatory power (Chin, 1998; Henseler *et al.*, 2009). However, Henseler *et al.* (2009) indicates that moderate or average  $R^2$  values are acceptable when the endogenous latent variables (LVs) is explained by few exogenous LVs. In this study, the SmartPLS algorithm function was used to obtain the  $R^2$  values, while the SmartPLS bootstrapping function was used to generate the  $t$ -statistics values. For this study, the bootstrapping generated 5,000 samples from 223 cases. TR, IR, and capabilities explained 13.4 percent of the variance in ERM with  $R^2 = (0.134)$ , which is considered moderate. According to Henseler *et al.* (2009), moderate  $R^2$  values are acceptable when the endogenous LV are explained by few exogenous latent variables.

Effect size refers to the impact of an independent latent variables on dependent latent variables (Andreev *et al.*, 2009; Chin, 1998; Henseler *et al.*, 2009). Effect size can be evaluated by using Cohen's (1988) ( $f^2$ ). The  $f^2$  value of 0.15 indicates IR have a medium effect in producing the  $R^2$  for ERM. On the other hand, other exogenous variable like TR and CAP have a very small to almost nil effect in producing the  $R^2$  for ERM.

*Predictive power.* Assessment of the path coefficient (refer Table III) shows that  $H1$  and  $H3$  were not supported with the TR and ERM relationship having a  $\beta = (0.052)$ , with  $t$ -value  $= (0.333)$ , and are not significant. Similarly, the path coefficient between capabilities and ERM also was negatively related, with  $\beta = (-0.042)$  and  $t$ -value  $= 0.429$ . As a result,  $H1$  and  $H3$  were not supported. From the analysis, the path coefficient between IR and ERM was strong with  $\beta = (0.352)$  and  $t$ -value  $= 4.001$ . Therefore,  $H2$  was significant at a path 4.001. As a result,  $H2$  was supported.

Table III lists the path coefficients, observed  $t$ -statistics, and significance level for all hypothesized paths. Using the results from the path assessment, the acceptance or rejection of the proposed hypotheses was determined and are presented in Table IV

The predictive relevance ( $Q^2$ ) of ERM has a value of 0.09, which is greater than 0. This indicates that the model has a close to medium predictive relevance for this

**Table III.**  
Path coefficients,  
observed  $t$ -statistics  
and results for all  
hypothesized path

Hypothesis	Path coefficient	SE	$t$ -value	Results
Capabilities→enterprise risk management	-0.042	0.097	0.429	Not supported
Intangible resources→enterprise risk management	0.358	0.090	4.001**	Supported
Tangible resources→enterprise risk management	0.052	0.155	0.333	Not supported

**Notes:** \* $t$ -values  $> 1.645$  ( $p < 0.05$ ); \*\* $t$ -values  $> 2.33$  ( $p < 0.01$ ) (one-tailed test)

**Table IV.**  
Hypotheses  
testing result

Hypotheses statement	Result
$H1$ Tangible resources have significant impact on the effectiveness of enterprise risk management	Not supported
$H2$ Intangible resources have significant impact on the effectiveness of enterprise risk management	Supported
$H3$ Capabilities have significant impact on the effectiveness of enterprise risk management	Not supported

construct. The results of the path coefficient between the constructs and the predictive relevance ( $Q^2$ ) in the structural model LVs demonstrates the predictive power of the structural model. According to Henseler *et al.* (2009), values of 0.35, 0.15, and 0.02 indicate large, medium, and small relative impact ( $q^2$ ). The relative impact ( $q^2$ ) value of 0.158 is the effect size for the predictive relevance of IR on ERM.

The 0.158 result indicates that IR has a medium effect in producing the  $Q^2$  (predictive relevance) for ERM. 0.001 and 0.002 are the  $q^2$  effect size for the predictive relevance of TR and capabilities (CAP) on ERM. The 0.001 and 0.002 indicates that TR and CAP have a very small effect in producing the  $Q^2$  for ERM.

### Conclusion and contribution

Results from the study indicates that among the three dimensions of resources, IR is the most significant predictor compared to TR and capabilities in explaining the relationships of resources toward the effectiveness of ERM process within an organization. This supports the finding of Galbreath and Galvin (2008) on the significant impact of IR toward any positive outcome for the organization. However, this study also shows that the three distinct dimensions of resources should collectively exist within the firm in order to complement each other and thereby strengthen the firm in implementing any action for the positive outcome of the company, namely the ERM process.

Overall, the findings of this research provide evidence that several hypotheses were supported or not supported. This was not surprising as many of the hypotheses were tested with scales from the existing literature that had previously shown support or contradict the previous findings. It is concluded that IR have the strongest influence on the effectiveness of ERM. On the other hand, TR and capabilities did not influence the effectiveness of ERM in general. This research has provide new perspective that IR should be given utmost importance in terms of its allocation in order to optimize the effectiveness of ERM within the firm. In order to ensure that efficient risk profiles of the firm been manage effectively most of the time, the efficient allocation of IR also have to be in order. Both element and process integrate with each other in holistic manner. Its constant practices should become an important corporate knowledge within the firm and embedded into unique culture which will reshape the norms and rules of the company toward superior performance and most importantly sustainable competitive advantage. As with this research, future studies should continue to systematically test the core propositions of the other dimension of firm resources suggest that another fruitful avenue for future research would be in studying resource interactions, combinations, and recombinations with other internal process within the entity itself.

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