

## *Review*

# **The Enterprise Risk Management (ERM) and role of internal auditors in the ERM implementation: A review of related literature on measurement instruments**

**Mohd Ariff Bin Kasim\* and Siti Rosmaini Binti Mohd Hanafi**

Department of Accounting, College of Business Administration, Ajman University of Science and Technology (AUST),  
Ajman, United Arab Emirates (UAE).

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The primary objective of this study is to comprehensively review the literature concerning existing instruments on the measures of the ERM implementation and roles of internal auditing (IA) in the Enterprise Risk Management (ERM) implementation. The study involves review of existing ERM instruments from 2001 to 2011. The present instrument were critically reviewed in which the contributions and limitations of each is appropriately identified and summarized. The review identified four main limitations of the existing ERM instruments that limit its applicability in academic setting. First, there is no consistency on the attributes used to tap the construct, that is, the ERM. Second, most of the instruments were not based on any well accepted ERM framework. Third, almost all of the instruments do not incorporate the roles of IA in the ERM. Finally, all of the instruments do not attempt to appropriately quantify the measurement of the ERM and this is evidenced by the use of categorical scales. This review could add value to academic research by providing analysis, comments and summary of various ERM instruments for ten years. This may assist more studies in this area that currently lack academic-based measurement tools. This present review could be among the significance source of reference for academic research especially on the measurement of the ERM implementation and IA roles in the implementation. It also could serve as guidance for the development of new academic-based instrument. Further, this review offers new solution to critical research questions concerning the structure, framework and measurement procedures.

**Key words:** Enterprise risk management (ERM), internal auditing (IA), IA roles, COSO ERM framework, corporate governance, risk assessment tools.

## **INTRODUCTION**

The corporate scandals that emerged by the end of 2008 and stretched until end of 2011 have demanded urgent and serious focus in the area of risk management. Clearly, the volatility of the various financial markets and the complexities of business transactions as well as investment instruments point to the need for a systematic approach to enhance corporate governance and oversight. Perhaps, the traditional governance model is inadequate for the present business environment in

which businesses are exposing to complicated risk environments. Indeed, the traditional governance practices should be redefined by incorporating the risk management mechanism (Brown et al., 2009). In fact, the risks exposures through the credit crisis originated by late 2008 coupled with the recent European financial crisis could boost the ERM philosophy as one of the alternative management and governance tools that could help protect companies from wide range of exposures to risks (Burnaby and Hass, 2009). However, in response to the demand for better governance, the Institute of Internal Auditors (IIA) recognised the evolving roles of internal auditors (IA) as an indispensable cornerstone of effective

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\*Corresponding author. E-mail: [m.ariff@ajman.ac.ae](mailto:m.ariff@ajman.ac.ae).

organisational governance mechanism. The IIA suggested that an IA was an integral part of the ERM implementation (IIA, 2004).

The ERM philosophy was well accepted by various corporations which proved to serve as one of the elements that helped the organisations achieve their objectives (Burnaby and Hass, 2009). In spite of this development, academic research in the area of risk management that involves the enterprise widely is limited (IIARF, 2005; Kimbrough, 2006; Sarens, 2009). Studies on the ERM implementation generally driven by consulting firms (ACCA, 2008; AON, 2007; CAS, 2001; Deloitte, 2004; IACCM, 2002; IIA, 2005; KPMG, 2005; Protiviti, 2005; PWC, 2004, 2006; RMA, 2006), thus such studies lacking in empirical evident. Further, these studies were limited to descriptive and superficial discussions. In light of the present economic downturn due to financial meltdown in the Europe, perhaps more empirical research could help us to better understand and be more prepared for the future economic challenges.

Inadequate numbers of empirical studies perhaps due to the unavailability of research instruments that allow researchers to explore the issue in greater details. The issue or research questions raise are what would be the basis to measure the degree of the ERM implementation? Which of the ERM frameworks to be used as a basis of measurement? How could we measure the IA contribution in the implementation of the ERM? and is it possible to quantitatively measure the degree of the ERM implementation? These are the main questions or issues that need to be resolved in effort to inspire more empirical studies. The primary objective of this study is to comprehensively review the literature concerning existing instruments on the measures of the ERM implementation and roles of IA in the ERM implementation.

## LITERATURE REVIEW

Review of related literature concerning instruments on the ERM revealed various approaches attempt to measure the ERM. List of the existing instruments measuring ERM is presented in Table 1. The discussion in this area revolves on four main issues, 1) the scope of the existing instruments, 2) the ERM frameworks used 3) measurement on the IA' role in the ERM and 4) the nature of the measurement scales used in the existing instruments.

The scope existing instruments provide diverse scope concerning the assessment of the ERM. Indeed, despite the existence of various ERM frameworks such as the Australia and New Zealand Risk Management Standard, Canadian Risk Management Guidelines, British Risk Management Standards, the FERMA Risk Management Standards, COSO's ERM framework and the ISO 31000 on Risk Management (Moeller, 2007), very few of these

instruments adopt the frameworks as a basis of the assessment leading to the diverse scope of assessments (IIARF, 2005; Kimbrough, 2006; KPMG, 2005; PWC, 2006; Wechster, 2007). Some of the instruments provide detail measure covering broad spectrum of ERM range from the existence of Chief Risk Officer while others on various method used to identify and evaluate risks. However, most of the existing measures are not academic-based. Instead, they are consultant or practitioner-based (AON, 2007; CAS, 2001; Copeman and Joy, 2006; Deloitte, 2004; IACCM, 2002; Protiviti, 2005; PWC, 2004; RMA, 2006). The set of questions designed also varied widely dependent on the author's interest and this is consistent with what was reported by Kimbrough (2006) who provided similar conclusion. This, further justify the infant stage of academic research on this new area.

In the earlier stage of assessing risks, the primary focus of the assessment were on the types of risks, level and source of knowledge in risk assessment, time spent on risk assessment, risk prioritization and type of executive in charge of the ERM (CAS, 2001). Then, the assessment evolved by incorporating the evaluation based on organizational maturity model concerning the maturity of the ERM. Such maturity was measured based on culture, processes, experience and application (IACCM, 2002). It was then expanded to include the assessment on the existence of the ERM unit (PWC, 2004) and reasons for the adoption of the ERM as well as company's sentiment on the adoption of the ERM. Moreover, the ERM instrument by PWC (2004) also incorporates assessment on the risk management responsibility, risks source, risk categorization and risk communication. The broad scope of risk assessment in this instrument provides great improvement compared to the existing measures (CAS, 2001; IACCM, 2002). Nonetheless, this instrument fails to incorporate the element on risk monitoring which is critical in the ERM implementation.

Deloitte (2004) introduce its risk assessment instrument which focuses specifically on financial institutions. This instrument was designed based on the Basel II framework. This is indeed among the first instrument that was developed for specific industry and was based on a well-accepted framework. It covers area such as risk governance, regulatory, processes, credit risk management, market risks, asset management, operational and information technology. In fact, this was the first instrument that considers the assessment of IT risks. Despite its broad perspective on risk assessments, it limits the applicability to financial institutions.

Protiviti (2005) later introduced detail assessment items on risk that involve the analysis on changes in risk profile, risk management capability, quantifying and deploying of risk and ownership of risk. In 2005 also there were another two risk assessment instruments that were based on COSO ERM framework (COSO, 2004a, 2004b). In fact,

**Table 1.** List of Existing Instruments Measuring ERM.

No.	Author	Scales	Component Assessed	Contribution	Limitation
1	Kasim et al. (2011)	-Ratio based	<ul style="list-style-type: none"> <li>- The entire eight components of COSO's ERM framework</li> <li>- The entire IA roles in the IIA Position Paper</li> </ul>	<ul style="list-style-type: none"> <li>-Permit collection of ratio data</li> <li>-Covers entire COSO's ERM framework and IIA Position Paper</li> </ul>	<ul style="list-style-type: none"> <li>-Required self-administered approach which could be subjective</li> </ul>
2	AON (2007)	-Rank of 5-point Likert based	<ul style="list-style-type: none"> <li>- Risk description</li> <li>-Damage to reputation</li> <li>-Business interruption</li> <li>-Third party liability</li> <li>-Distribution and supply chain failure</li> <li>-Market environment</li> <li>-Risk preparedness</li> </ul>	<ul style="list-style-type: none"> <li>-Focus more on risk concern by management</li> <li>-Cover extent of preparedness towards risks</li> </ul>	<ul style="list-style-type: none"> <li>-Too simple questions asked</li> <li>-Cover small aspect of ERM</li> <li>-Subjective measures</li> <li>-Not based on COSO</li> </ul>
3	Wechsler (2007)	-categorical	<ul style="list-style-type: none"> <li>-Risk identification</li> <li>-Risk analysis and quantification</li> <li>-Risk response and mitigation</li> <li>-Risk reporting and monitoring</li> <li>-The use of technology in ERM</li> <li>-Risk terminology used</li> <li>-Person primarily responsible for ERM</li> <li>-Key challenge to implement ERM</li> </ul>	<ul style="list-style-type: none"> <li>-Consider various aspect of ERM</li> <li>-Include the impact of technology on ERM</li> <li>-Base on COSO</li> </ul>	<ul style="list-style-type: none"> <li>-Subjective measures</li> <li>-Limit results to percentage</li> <li>-Not entirely based on COSO</li> </ul>
4	Kimbrough (2006)	-Likert-based with quantitative measures	<ul style="list-style-type: none"> <li>-Internal environment</li> <li>-Objective setting</li> <li>-Event identification</li> <li>-Risk assessment</li> <li>-Risk response</li> <li>-Control activities</li> <li>-Information and communication</li> <li>-Monitoring</li> </ul>	<ul style="list-style-type: none"> <li>-Cover the whole COSO framework</li> <li>-Quantitative scales</li> </ul>	<ul style="list-style-type: none"> <li>-No detail items for each attributes</li> <li>-To certain extent data are ordinal.</li> </ul>
5	Copeman and Joy (2006)	-Categorical	<ul style="list-style-type: none"> <li>-Major ERM driving force</li> <li>-Approach in ERM</li> <li>-Existence of ERM framework</li> <li>-Existence of CRO position</li> <li>-Effectiveness of ERM</li> </ul>	<ul style="list-style-type: none"> <li>-Focus more on existence of CRO</li> </ul>	<ul style="list-style-type: none"> <li>-Cover limited aspect of ERM</li> <li>-Not based on COSO</li> <li>-Subjective measures</li> </ul>

Table 1. Contd.

6	PWC (2006)	-categorical Likert-based	-ERM function and process -Motivation to adopt ERM -Company impression on ERM -Risk assessment -Risk management responsibilities -Risk source -Risk categorization -Risk communication -Benefits of ERM -COSO framework on ERM	-Use COSO framework	-Subjective measures
7	RMA (2006)	-Categorical -Likert-based	-Placement of ERM management -Influences driving ERM -Benefits of ERM -Effectiveness of ERM -Function included in ERM -Existence of separate unit of ERM -Responsibility of ERM units -Existence of formal ERM policy -Frequency of meeting -Existence of risk language -Challenges in implementing ERM	-Various aspect of ERM -Consider formal ERM policy -Separate unit of ERM	-Not based on COSO -Subjective measures – Likert-based
8	KPMG (2005)	-Categorical	-Risk policy and strategy -Risk structure -Risk optimization -Risk portfolio -Measuring and monitoring risk	-More serious issue on ERM -Partly on COSO framework	-Not entirely based on COSO -Subjective measures -No detail attribute provided.
9	IIARF (2005)	-Categorical	-Impact of COSO framework on company ERM plan -Status of ERM activities -Benefits of ERM as based on COSO framework -Primary ERM implementation barriers. -Role of IA in ERM process -IMPORTANCE of IT on risk management process	-Based on COSO -Incorporate role of IA -Measure impact of IT on risk management	-Subjective measures -Categorical, limit respondent's choice

Table 1. Contd.

10	Protiviti (2005)	-Likert-based, 10-points	<ul style="list-style-type: none"> <li>-Changes in risk profile</li> <li>-Risk management capabilities</li> <li>-Quantifying and deploying risk</li> <li>-Ownership of risk capabilities</li> <li>-Current status of risks</li> </ul>	<ul style="list-style-type: none"> <li>-Detail item for each attributes</li> <li>-Analyze present state of ERM</li> </ul>	<ul style="list-style-type: none"> <li>-Subjective</li> <li>-Not based on COSO</li> </ul>
11	Deloitte (2004)	-Categorical	<ul style="list-style-type: none"> <li>-Risk governance</li> <li>-Regulatory and economic capital</li> <li>-ERM process</li> <li>-Credit risk management</li> <li>-Market risk and assets management</li> <li>-Operational risk management</li> <li>-Risk system and technology</li> </ul>	<ul style="list-style-type: none"> <li>-Various practical aspect of ERM</li> <li>-Based on Basel II frameworks (financial institutions)</li> </ul>	<ul style="list-style-type: none"> <li>-Not base on COSO</li> <li>-Only applicable to financial institutions</li> <li>-Subjective measures</li> </ul>
12	PWC (2004)	-Categorical -Likert-based	<ul style="list-style-type: none"> <li>-ERM function and process</li> <li>-Motivation to adopt ERM</li> <li>-Company sentiment towards ERM</li> <li>-Risk assessment</li> <li>-Risk management responsibility</li> <li>-Risk source</li> <li>-Risk categorization</li> <li>-risk communication</li> <li>-benefits of ERM</li> </ul>	<ul style="list-style-type: none"> <li>-Broad scope</li> </ul>	<ul style="list-style-type: none"> <li>-No specific scope or ERM</li> <li>-Not based on COSO's</li> <li>-Subjective measure</li> </ul>
13	IACCM (2002)	<ul style="list-style-type: none"> <li>-Index</li> <li>-Score of 4-point</li> <li>1, Novice</li> <li>2, Competence</li> <li>3, Proficient</li> <li>4, Expert</li> </ul>	<ul style="list-style-type: none"> <li>-Assess maturity of ERM</li> <li>-Basis of assessment</li> <li>-Culture</li> <li>-Process</li> <li>-Experience</li> <li>-Application</li> <li>-Each were assessed using 4point categorical measures</li> </ul>	<ul style="list-style-type: none"> <li>-Based on organizational maturity model</li> <li>-More objective measures</li> </ul>	<ul style="list-style-type: none"> <li>-Not based on COSO</li> <li>-Categorical based thus limit to ordinal data</li> </ul>
14	CAS (2001)	-categorical	<ul style="list-style-type: none"> <li>Type of risks</li> <li>-Level of knowledge in ERM</li> <li>-Sources of ERM knowledge</li> <li>-Average time spent in ERM</li> </ul>	<ul style="list-style-type: none"> <li>-Very detail attributes</li> <li>-Mainly focus on actuarial society</li> </ul>	<ul style="list-style-type: none"> <li>MCQ measures- limit analysis</li> <li>-Not based on COSO</li> </ul>

Table 1. Contd.

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-Analysis and quantification of risk  
 -Assessment on risk prioritization  
 -Type of practitioners in ERM unit  
 -Primary roles in ERM

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these were the first two instruments incorporating COSO ERM framework. Later, the IIA introduce an instrument that was entirely based on the framework (IIARF, 2005) while KPMG (2005) utilized only portion of it. These instruments include the assessment on the impact of COSO ERM framework on organization's ERM plan, status of the ERM activities, benefits and implementation barriers.

The assessment instrument by RMA (2006), PWC (2006) and Capeman and Joy (2006) had incorporated various elements on the ERM presented in previous instruments such as the benefits, challenges, responsibility and communication. Interestingly, these instruments started to consider the existence of the Chief Risk Officer (CRO) and separation of the ERM unit (Copeman and Joy, 2006; RMA, 2006). Though some of the elements in the COSO ERM framework were considered, monitoring element of the framework was ignored. Later, Kimbrough (2006) introduced his risk assessment instrument which was entirely based on the COSO ERM framework. It consist of eight elements range from internal environment, objective setting, event identification, risk assessment, risk response, control activities, information and communication and monitoring. Despite the fact that this instrument was designed entirely based on COSO ERM framework, it fails to provide sub-attributes for each of the eight elements. The instrument merely adopts the entire definition of each

construct as stated in the framework. The broad definition of each construct without sub-attributes to tap each construct may limit the respondents' ability to provide accurate description on the status of each construct.

Indeed, risk assessment instrument by Wechster (2007) offered wide scope of assessment incorporating elements from existing instruments that range from risk identification to key challenges to the ERM implementation. Another assessment was introduced by AON (2007) that focus primarily on reputation risk. It covers element such as the description of the risk, damage to reputation, business interruption, third party liability, supply chain failure and market environment. Nonetheless, all of these instruments were practitioners-based that may limit its applicability in academic research setting.

Kasim et al. (2011) introduced an improved version of the ERM instrument by considering the limitations of the existing ERM instruments. The instrument aims to provide quantitative assessment on the ERM implementation. Moreover, this instrument also incorporates the IA' roles in the ERM. Indeed, this new instrument provides solution to the present research questions, that is, what would be the basis to measure the degree of the ERM implementation? And which of the ERM frameworks to be used as a basis of measurement? This instrument measures the degree of the ERM implementation based on the eight components in the COSO's ERM framework. In

contrast to Kimbrough (2006), its provides detail 30 sub-questions for the eight elements of the ERM suggested in COSO framework. These questions aim to properly tap the eight ERM elements and to sufficiently describe the construct to the respondents. For example, internal environment is described by six questions; Objective setting by two questions; event identification by four questions; risk assessment by three questions; risk response by three questions; control activities by four questions; information and communication by four questions and monitoring by four questions. This is among the first academic-based research instrument that was developed entirely based on the COSO's ERM framework. Additionally, the instrument was subjected to detail development and review processes concerning its reliability and validity.

The second issue concerns the use of ERM framework. Indeed, there are various ERM frameworks but COSO ERM framework was adopted by most organizations all over the world except those from Australia and New Zealand (Moeller, 2007). One of the dominant players in establishing the guidelines on risk management, the International Federation of Accountants (IFAC) had published material on risk management with the title "enhancing shareholder wealth by better managing business risk (IFAC, 2003). The publication was in 1999 which is much earlier than the issuance of COSO ERM framework. This publication was also drafted by the Price Water House

Coopers (PWC) that was later involved in the COSO ERM project. The COSO had published its framework on risk management that was termed The Enterprise Risk Management-Integrated framework in September 2004 (COSO, 2004a). In fact, it was confirmed by Moeller (2007) that the guidance on risk management issued by IFAC will follow those in the COSO ERM framework. This claimed serve as the basis for the adoption and wide acceptance of the COSO ERM framework. It was later further confirmed by Purdy (2008) that very significant number of organizations around the world had invested a significant effort and resources to implement the ERM based on the COSO framework. Moreover, it was referred by IIA as a basis for the issuance of the position paper on IA roles in the ERM as well as others matters concerning the ERM (IIA, 2004, 2005).

Despite the fact that there are other ERM frameworks as highlighted in earlier section, most of the existing instruments were not designed based on any of those frameworks (AON, 2007; CAS, 2001; Copeman and Joy, 2006; IACCM, 2002; Protiviti, 2005; RMA, 2006). Reliance on specific framework could enable the establishment of a comprehensive and well accepted scope of the ERM assessment. It is undeniable that there are few instruments that cover entire or portion of the COSO's ERM framework (IIARF, 2005; Kimbrough, 2006; KPMG, 2005; PWC, 2006; Wechster, 2007). Recall the second research question on which of the ERM framework to be used as a basis to measure ERM. The present review indicated that due to wide acceptance and adoption of the COSO's ERM framework, it is therefore the primary framework to be considered.

The third issue is on the scope for the assessment of the IA's roles in the ERM implementation. Indeed, most of the existing measures did not incorporate this element in their risk assessment. With reference to the new definition of internal auditing (IIA, 1999), ERM is considered part of the main IA responsibilities besides internal control and governance. Currently, only the instrument by IIARF (2005) included the assessment on the IA roles in the ERM. The IIA had issued a specific framework with regard to the roles of IA in the ERM implementation (IIA, 2004). The framework described three main roles termed as core internal audit roles in regard to ERM, legitimate internal audit roles with safeguards and roles internal audit should not undertake. The framework basically identified two main roles that IA should perform in ERM and one category of roles that IA should not perform. The internal auditor core roles in the ERM is congruence with the assurance activities while the legitimate roles reflect the consulting activities stipulated in the new definition of internal audit (IIA, 1999, 2004, 2006).

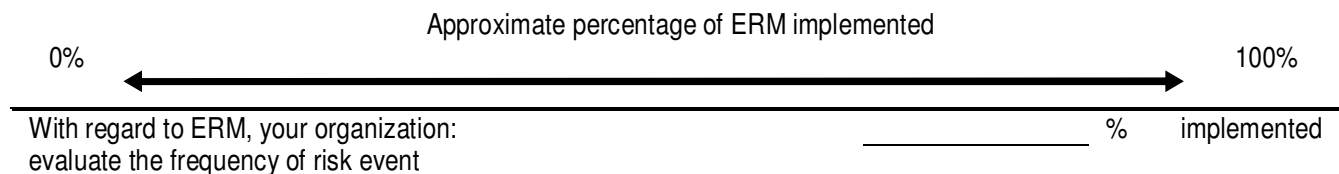
In another perspective, although some organizations may have separate ERM unit to focus on the ERM implementation, IA still have significant roles to be performed in the implementation of the ERM (Bowling

and Rieger, 2005; IIA, 2005; Scott et al., 2004; Tidrick, 2005). Undoubtedly, the IIARF (2005) instrument was the first to incorporate the assessment on the roles of IA in the ERM implementation. Indeed, this is parallel with the launched of the IIA position paper (IIA, 2004) on the role of IA in the ERM as well as COSO ERM framework (COSO, 2004a, 2004b). Nonetheless, the instrument by the IIARF (2005) did not provide any segregation concerning the IA roles as suggested by the IIA's position paper such as core, legitimate and roles the IA should not undertake. Major limitation of the instrument by IIARF (2005) was the fact that it did not provide sufficient description to tap each role.

This limitation was appropriately address by Kasim et al. (2011) in their instrument which involves 20 questions to appropriately describes the three main IA roles. Although the third roles were termed by the IIA position paper as "roles IA should not undertake", it was labeled as prohibitive roles in the instrument. Examples of a few of the questions measuring core roles were "provide assurance that all risks affecting the organization from achieving its objectives are identified"; "ensure that the organization established reliable and appropriate risk management techniques"; and "ensure key risks are communicated to top management or board". A total of six questions were designed to tap the core roles. The legitimate roles of the internal auditor were measured using nine questions, a few examples of which included "take the initiative to introduce ERM to the organization"; "coordinate and monitor all the ERM processes"; and "help establish the reporting line of risk in the organization". Finally, the instrument also included the prohibitive roles. The involvement of the internal auditor in this role would violate the independence and objectivity of the internal auditor itself. There were five questions designed to measure this construct. Some examples of the queries were: "establish the organization's risk appetite"; "make all decisions related to risk response"; and "implement all risk responses on behalf of the management team".

The design of the instrument that provided the various sub-dimensions to measure the construct of the ERM and the internal auditor's role in the ERM was hoped to accurately measure the constructs while at the same time provided a significant contribution to the existing literature. Moreover, the review revealed that the questions for each of the attribute were designed based on well accepted framework on internal auditor's roles in the ERM.

The final issue is on the measurement scales. It is crucial to identify the types of data gathered whether they are ordinal, ratio, nominal or interval. According to Keller and Warrack (2000), if data can be ordered preferentially, those data are considered as ranked data and are said to have an ordinal scale. The responses using Likert-based scale is considered as non-quantitative data because the data are ranked based on preferences. In addition,



**Figure 1.** Example of the modified scale.

Douglas et al. (2006) suggested that we are unable to differentiate the magnitude of the differences between the ranks. For instance, is the difference between “strongly disagree” and “disagree” is the same as the difference between “strongly agree” and “agree”? Therefore we can only conclude that rating 1 is better than rating 2 or 3 and 4 but we cannot determine how much better the rating is quantitatively. Thus, it is clear that the data obtained using the above mentioned scale is ordinal in nature, which limit for non-parametric tests. Virtually all the existing instruments (AON, 2007; CAS, 2001; Copeman and Joy, 2006; Deloitte, 2004; IACCM, 2002; IIARF, 2005; KPMG, 2005; Protiviti, 2005; PWC, 2004, 2006; RMA, 2006; Wechster, 2007) limit their measurement scales to categorical in nature. Although some of the instruments were based on Likert-based scales, it is argued to be non-quantitative.

In lights of this development, Kimbrough (2006) had provided improvement to the assessment scales by designing scales that incorporates more objective measurement. Instead of using traditional Likert-based scale, which the afore-mentioned argument considered as non-quantitative, Kimbrough introduced more objective scale aim to provide quantitative measure. By using Kimbrough’s scale one could determine the differences between the ranks. For instance, the difference between the ranks was 25% and similar or constant percentage was maintained throughout the scale. This may be correct for Kimbrough to argue such scale may provide quantitative measures considering the argument by Douglas et al. (2006). Example of the scale by Kimbrough (2006) is 0, 25, 50, 75 and 100%.

Indeed, Kimbrough (2006) had provided substantial improvement by designing an instrument on ERM implementation that incorporated a more objective measurement. However, there are some limitations to Kimbrough’s scale as respondents may face difficulties in determining the appropriate percentage to circle and they are forced by the scale to indicate the degree of the ERM implementation within the given range. For example choices limited to only 0, 25, 50, 75 and 100%. With regard to Kimbrough’s scale, one may argue that there may be a possibility that respondents would like to indicate particular percentage that are not within the choices. For example, if the organization implemented, for instance 13, 22 or 72% of the ERM activities.

By considering the limitation of Kimbrough’s scale, Kasim et al. (2011) introduced modified scales to enable

the collection of ratio data. This scale enabled the respondents to indicate any percentage on ERM implementation from 0 to 100%. 0% represented that none of the ERM activity was implemented and 100% denoted maximum implementation of the ERM activity. An example of the modified scale is shown in Figure 1.

This scale was considered appropriate and be able to provide a high degree of data that is, ratio data. In addition, the scale enabled respondents to indicate any number on an individual question without being confined to specific range of percentages. Thus, allowing the ratio type of data to be collected. Statistically, the ratio type of data was the highest quality of data permitting various tests. Indeed, permitting the execution of various statistical tests that are not possible for categorical data.

## CONCLUSION

Overall observation of the existing instruments on the assessment of the ERM revealed four main limitations. First, there is no consistency on the attributes used to tap the construct, that is, the ERM. Second, most of the instruments were not based on COSO ERM framework which was adopted by most organizations. Third, almost all of the instruments do not incorporate the roles of IA in the ERM. Finally, all of the instruments do not attempt to appropriately quantify the measurement of the ERM and this is evidenced by the use of categorical scales. Presently, the evolution on the assessment of the ERM could be traced since 2001. However, most of the existing instruments were consultant-based which limit it applicability to academic setting. The ERM instrument by Kasim et al. (2011) offers solution to the critical research questions highlighted in this paper. Failure to quantify the ERM could be one of the reasons for limited number of research in this new and interesting area of studies. Most of the existing studies limit to the descriptive discussion on the issues. The need for a valid and reliable instrument to quantitatively measure the ERM implementation as well as roles of internal auditing in ERM is critical. Most of the existing study did not attempt to develop such instrument that permits quantitative measure. The present study narrows the gap in the literature particularly on the measurement of the ERM implementation and IA roles in the ERM. Nonetheless, the instrument developed by Kasim et al. (2011) demand more studies to test its validity and reliability. Currently, it was tested in only two



research settings in Malaysia. Perhaps, future studies should test the instrument in different research setting to improve its applicability. Further, with the released of ISO 31000, it would be interesting to have ERM assessment by incorporating the ISO guidelines.

## RESEARCH IMPLICATION

This review could add value to academic research by providing analysis, comments and summary of various ERM instruments for ten years. This may assist the academic-based ERM studies that could bridge the current gap in the literature. Moreover, this review could be among the significance source of reference for academic research especially on the measurement of the ERM implementation and IA roles in the implementation. It also could serve as guidance for the development of new academic-based instrument. Further, this review offers new solution to critical research questions concerning the structure, framework and measurement procedures.

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