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RISK MANAGEMENT AND INTERNAL CONTROL: A STUDY OF MANAGEMENT ACCOUNTING PRACTICE

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ABSTRACT

Purpose – *This article examines management accounting practice in relation to the two aspects of Enterprise Risk Management (ERM): risk management and internal controls.*

Methodology/Approach – *We conducted a survey of experienced management accountants to find out about the risk management and internal control aspects of their current ERM practices, and their perceived effectiveness in performing various ERM roles, within the context of the ERM culture and the level of information systems support for ERM in their organizations.*

Findings – *In terms of the risk management aspects of ERM, the management accountants in the survey contribute highly to managing risks of a*

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financial or compliance/legal nature and tend to focus mostly on risks with potentially higher impact and higher likelihood of occurring. In terms of the internal control aspects of ERM, they play a highly important role in ERM activities related to prevention and internal risk treatment. Their organizations have an ERM culture that is perceived as open to challenging discussions about risk and have implemented IS support for management accounting in areas such as information security and standardized information architecture. Overall, the effectiveness of their contributions to ERM is perceived to be high in the areas of compliance and finance-related risk.

Originality/Value – *We develop a framework and offer empirical evidence about the ERM contributions of management accountants. We propose and use two original scales: one to classify ERM activities, and the other to assess ERM culture.*

Keywords: Risk management; internal control; COSO; management accounting practice; risk nature; risk likelihood; risk consequences; ERM culture

INTRODUCTION

Over the past decade, there has been increasing pressure for organizations to design and implement Enterprise Risk Management (ERM) systems. Large-scale accounting frauds such as Enron and WorldCom have prompted new legislation such as the Sarbanes–Oxley (SOX) Act of 2002. This has resulted in the revamping of internal controls in a wide range of companies to comply with SOX section 404 requirements. The private sector has also responded, issuing a comprehensive Internal Control Integrated Framework (first issued in 2004, then revised in 2013) through the Committee of Sponsoring Organizations of the Treadway Commission (COSO), explicitly identifying risk assessment as a key component for effective corporate governance.

COSO's *Enterprise Risk Management Framework*, published in 2004, further expanded the Internal Control framework to develop detailed guidelines for objective setting, event identification, risk assessment and response, among other elements. Since COSO's original ERM framework, other proposals for improved risk management (RM) have been published, such as the International Organization for Standardization (ISO)'s standard 31000. In the fall of 2016, COSO's board received public comments about a proposed update of its ERM framework. The revised framework, which addresses the increasing complexity of risk management, is scheduled for

release in 2017. Since the financial crisis of 2008, close scrutiny of ERM practices for the purposes of ratings by agencies such as Standard & Poor, additional Securities Exchange Commission (SEC) proxy statement requirements of risk oversight disclosures, and public awareness of the consequences of neglecting risk management have led to mounting pressure on boards of directors and senior executives to take ERM seriously (see review in Merchant & Spaulding, 2012).

This pressure for technical improvements in ERM practices should help organizations develop their capacity for identifying and treating risk more systematically. In this context, management accountants can make a valuable contribution. With their experience in designing and implementing internal controls and providing relevant information for decision-making, management accountants "can champion the importance of good risk management, including internal control…they can set the tone for good RM/IC [risk management/internal control] throughout the organization … [and] ensure RM/IC is part of every decision-making process and subsequent planning and execution" (McNally & Tophoff, 2014, pp. 35–36).

Risk, though, is not merely a technical issue; it is an emotionally complex concept for humans to handle. From an evolutionary viewpoint, we are hardwired to ignore uncontrollable risks (Kaplan & Mikes, 2012). Judgment and decision-making biases documented in psychology-based studies in areas such as auditing (Bonner, 2008) can also make ERM daunting. It has been shown that people can discard relevant information contrary to existing beliefs (confirmation bias), fail to revise forecasts in the face of new information (anchoring bias), and continue to justify more investments despite loss projections (escalation of commitment bias). At a collective level, a particular organizational culture, with its set of core, shared values may prevent organizational participants from even raising challenging questions about potential risks. Even if they do ask, such questions may be suppressed by dominant perceptions within a team (groupthink bias). Given these individual and cultural obstacles to ERM implementation, many organizations adopt ERM with a compliance mentality, and do not approach risks strategically (Hancock & Beasley, 2015).

In this context, management accountants are asked to help their organizations identify risks and opportunities associated with events that may not have happened yet, measure the probabilities of occurrence and financial consequences of such events, and explain why substantial investments in controls associated with those risks are necessary even though some threats may never actually materialize. For example, from the perspective of value-based management, the costs and benefits of risk management investments may

follow the nonlinear model proposed by Faupel and Michels (2014): initially risk management expenditures have to be made even if the benefits may not be measurable in monetary terms; at first, the slope of the curve increases more than proportionally, but then it increases less than proportionally, eventually reaching a point where additional risk management investments result in no (or minimal) additional increase in benefits, ceasing to further enhance company value.

Despite the growing body of guidance frameworks in the ERM area, management accountants are still charting new territory in regard to ERM practices. With their specialized experience and training in how to measure, report, and analyze the financial and nonfinancial impact of decisions, management accountants are in a unique position to play a leadership role in establishing ERM systems that are truly "enterprise" driven, not limited by functional silos, but that permeate decision-making throughout the organization. This expanded role fits into a new paradigm of management accounting that calls for the profession to broaden its strategic scope and overcome a myopic view of planning and control, focused on measuring past performance and overlooking more forward-looking measurements of organizational sustainability and risk (Flamholtz et al., 2016).

Our interdisciplinary study draws from the literature in organizational behavior and management accounting to examine the contributions of management accountants to ERM practices, both in terms of risk management and internal control. This explicit focus on studying the contribution of management accountants to ERM practice is part of a much-needed movement toward bridging the research-practice gap in the field (Merchant, 2012; Tucker & Lawson, 2017). Moreover, our interdisciplinary approach contributes to a new, more strategic paradigm for management accounting that transcends traditional silos to incorporate perspectives from management and from organizational measurement systems, instead of treating them as separate domains (Framholtz et al., 2017). This new paradigm expands the scope of management accounting practice and examines the areas that have risk management implications: for example, how management control practices may affect strategic alignments (Akroyd, Biswas, & Chuang, 2016); and how contemporary management accounting practices, which "relate operations, processes and/or activities with strategic outcomes," and which "focus on both historical and future events," may facilitate organizational change and contribute to organizational performance (Nuhu, Baird, & Appuhami, 2016, p. 73).

The ERM literature is still in its early stages of development, with a number of studies focused on current practices appearing regularly in practitioner publications such as *Strategic Finance* (published by the Institute of

Management Accountants) or on the website of the American Institute of Certified Public Accountants and its *Journal of Accountancy*. Notwithstanding the great value of these studies, there remains a lack of theory and academic studies that use empirical evidence to examine ERM in practice. The studies that have been carried out have documented the positive performance effects of ERM initiatives (e.g., Beasley, Branson, & Pagach, 2015; Gordon, Loeb, & Tseng, 2009; Hoyt & Liebenberg, 2011), while others have examined the elements that comprise ERM systems (Lundqvist, 2014). However, few empirical studies have explicitly measured ERM culture (notable exceptions are Kimbrough & Componation, 2009; Roeschmann, 2014), and there is little evidence of the role played by management accountants in ERM practices (an exception is the set of field interviews reported in Walker, Shenkir, & Barton, 2014).

Our study is intended to address this gap in the ERM literature. We surveyed management accountants participating in a Research Lab at an Institute of Management Accountants' annual conference, and collected data on their contributions to current ERM practices, addressing both risk management and internal controls. We also examined the effectiveness of management accountants' ERM contributions in the context of the ERM culture and the extent of information systems support for ERM in their organizations.

In this article, we start with a review of the research on ERM as it relates to the work of management accountants and develop a framework to integrate risk management and internal controls (McNally & Tophoff, 2014) to describe ERM practices. We follow this section with an explanation of the research methods and empirical results, including a discussion of their implications. We conclude with a summary of contributions for research and practice, limitations and suggestions for future studies.

CONCEPTUAL FRAMEWORK

According to ISO (Guide 73), risk is the "effect of uncertainty on objectives." This effect may be positive, negative, or simply a deviation from what was expected. Depending on how effectively organizations manage risk, they will improve or hamper their chances of achieving these objectives. Our study examines ERM effectiveness from a perspective that has not received much attention in empirical research: the contributions of management accountants to a range of ERM activities.

We propose a conceptual framework illustrated in *Fig. 1*. This framework was inspired by McNally and Tophoff (2014), who state that "risk

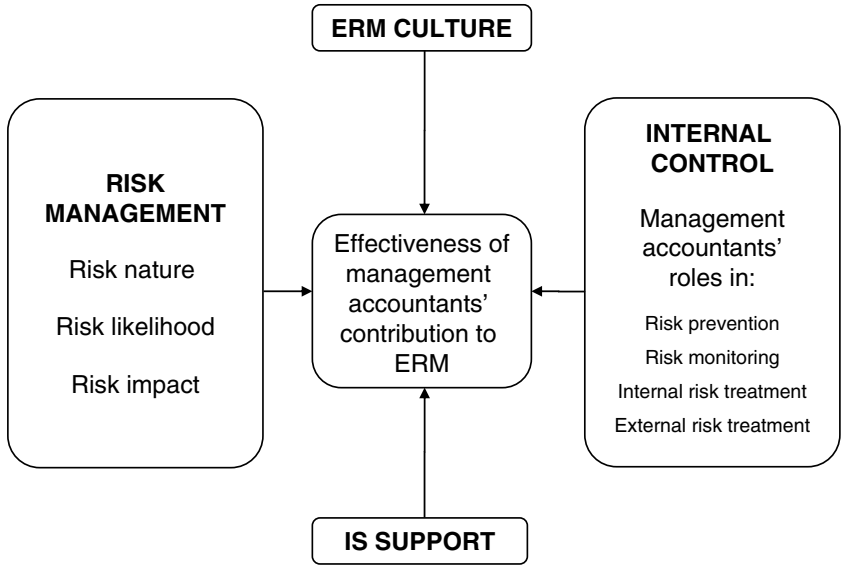

Fig. 1. Conceptual framework.

management and internal control can be viewed as two sides of the same coin in that risk management focuses on the identification of threats and opportunities, and controls are designed to effectively counter threats and take advantage of opportunities" (p. 32). Accordingly, we examine the contributions of management accountants to ERM practice in terms of risk management (including the nature, likelihood, and magnitude of impact of the risks being managed) and internal control (the roles management accountants play in different ERM activities related to prevention, monitoring, internal risk treatment, and external risk treatment). The effectiveness of management accountants in contributing to ERM activities is examined in the context of the ERM culture and the level of IS support for ERM in their organizations.

Risk Management

Nature of Risk

Management accountants provide information that contributes to the management of different types of risk. This "nature of risk" variable relates to the Event Identification component of COSO's ERM framework, whereby

"management considers a variety of internal and external factors that may give rise to risks and opportunities" (COSO, 2004).

Lundqvist (2014) proposed that a pillar of successful ERM is a firm's efforts to identify five key types of risk: financial, compliance, technology, economical, and reputation (p. 412). Management accountants, with their insight on what drives shareholder value in both monetary and nonfinancial terms, can potentially contribute information to help their organizations identify, track, and manage different types of risk (Hancok & Beasley, 2015). Here we examine the contribution of management accountants for managing risks of various natures: compliance and legal, employee-related, market-price, credit and liquidity, operational, information technology and data security, reputation, and strategic risks.

Risk Likelihood and Impact

Management accountants place varying levels of focus on managing risks with different combinations of high/low likelihood and impact, as represented in a 2×2 matrix of possible events. Merchant and Spaulding's (2012) field study on ERM implementation showed the usefulness of classifying risks according to their "hotness," in terms of where they fall in the different cells of such matrix. This corresponds to the Risk Assessment component of the COSO ERM framework.

Given limited resources to be deployed in controls for specific risks, management accountants can play a critical role in decisions regarding which risks are worthy of attention. There may be a greater focus on risks perceived as having potentially high impact (where monetary consequences are used as a criterion for magnitude of impact), because management accountants have developed expertise in estimating financial consequences of particular economic transactions, and might be relatively less familiar with inferential statistics. However, even in the more familiar domain of financial estimates, the accounting concept of an "entity" or "enterprise" may hinder the accountant's ability to consider negative externalities in terms of the likelihood and impact of risks to the community or society at large (Power, 2009). For example, faulty Firestone tires led to dozens of deaths and hundreds of injuries for drivers of Ford Explorers and other trucks in a scandal unveiled in the early 2000s, leading to the second largest tire recall in the industry's history (Simison, Lundegaard, Shirouzu, & Heller, 2000). The federal investigations revealed that the tire problems had been known by Firestone for years, but estimated to be too costly to repair and the likelihood of failure small. Such estimates of likelihood and impact seem to have ignored the negative

externalities to society, not to mention the gross underestimation of costs to both Firestone and Ford.

Here we explore both elements of the 2×2 risk matrix – likelihood and impact – and examine how much risk management focuses on risks of high versus low likelihood, risks of high versus low impact, and the various combinations of impact and likelihood.

Internal Control

Internal control deals with the threats and opportunities identified by the ERM system. It includes the processes and activities in which the enterprise needs to engage in order to align risk exposure with the levels accepted by the organization. Management accountants play a range of roles related to the internal control aspects of ERM, as detailed next.

Management Accountants' Role in ERM Activities

A key decision in the design of internal controls, as it relates to ERM activities, is the allocation of resources (e.g., financial, human resources, facilities, and equipment) to manage risk in cost-effective ways. This involves activities aimed at not only preventing incidents but also continuously assessing current practices and products, taking steps to correct mistakes that are detected by the controls, and mitigating losses when negative events occur. The wide range of necessary activities goes beyond simply following the expectations in the COSO ERM framework, to take advantage also of strategic opportunities.

Management accountants can play an important role in helping their organizations manage those activities, given their familiarity with regulatory standards, access to top management, and experience in providing relevant information for decision-making. For example, management accountants play internal control roles that may vary in importance in the performance of ERM activities. These activities may be directed at various stages of managing risk: from preventing risks (e.g., training staff on technical risk concepts, or providing risk-related information before a new product is launched) to confronting their consequences when problems arise with customers or regulators (e.g., estimating and analyzing the cost of alternative ways of delivering warranty repairs). However, the accounting profession still lacks a coherent taxonomy for the roles that management accountants may play in ERM activities.

For the purpose of this study, we applied the model originally developed for Cost of Quality (COQ) reporting (Ansari, Bell, & Klammer, 2004a) to

the management accountants' role in ERM activities, given the similarities between the two contexts. In the COQ context, firms classify their costs of quality into four categories (Prevention, Appraisal, Internal Failure, and External Failure) according to the activities performed at each stage of the quality management process. Similarly, this COQ model has been applied to environmental costing, whereby environmental activities are classified according to their purpose as Prevention, Assessment, Control, and Failure activities (Ansari, Bell, & Klammer, 2004b). Like quality and environmental-related activities, activities related to risk and internal control also encompass elements of preventing, monitoring, and treating the consequences of internal and external failures. We propose a COQ-informed taxonomy to classify the roles management accountants may play in ERM activities: *Prevention* (avoiding problems before they happen), *Monitoring* (ensuring compliance with standards), *Internal Risk Treatment* (correcting errors when internal events have already increased risk exposure), and *External Risk Treatment* (mitigating sales losses due to external problems).

Organizational Context of ERM Systems

ERM Culture

When management accountants pursue their risk management and internal control activities, this does not take place in a vacuum. Rather, their activities may be facilitated or hindered by the risk management culture of the organization (Barton & MacArthur, 2015; Kimbrough & Componation, 2009; Mikes, 2011; Roeschmann, 2014).

In spite of the emerging recognition of the importance of organizational culture for ERM, empirical investigation about this link is still limited. Our study focuses on an aspect of culture, "openness to risk challenge," which was identified by Barton and MacArthur (2015) as being critical for effective ERM. Barton and MacArthur's study, commissioned in 2013 by the Institute of Management Accountants (IMA) and the Association of Chartered Certified Accountants (ACCA), included experienced business professionals from New York, London, and Dubai, who were involved with critical risk issues on a regular basis. Their results suggest that "effective risk management can only exist in an organization when members of the organization are free to 'challenge' the riskiness of the status quo" (Barton & MacArthur, 2015, p. 118).

The ACCA-IMA study inspired us to investigate the degree to which management accountants in our sample were embedded in a "risk challenge culture," as described by Walker, Shenkir, and Barton (2014, 2015).

IS Support

The ability of management accountants to successfully perform ERM roles may be facilitated or hindered by the level of IS initiatives to support management accountants' ERM activities. The importance of IS support for risk management is explicitly recognized in the Information and Communication component of the COSO ERM framework. A literature review by Grabski, Leech, and Schmidt (2011) describes the main risk areas where information systems can support accounting practice, including implementation of compliance systems, audit support, information security, standardized chart of accounts, and business process integration.

Arnold, Benford, Canada, and Sutton (2015) also acknowledge that information systems are closely associated with successful ERM implementation, as IS can facilitate knowledge integration not only internally, across business units but also externally, while scanning the environment for threats and opportunities (Nazir & Pinsonneault, 2012). Thus IS support can help management accountants deal with the complex demands of different stakeholders within the enterprise, meeting compliance requirements as well as contributing strategically to the exploitation of business opportunities. Therefore, our conceptual framework includes IS support as part of the organizational context that influences the effectiveness of management accountants' contributions to ERM activities.

Effectiveness of Management Accountants' Contribution to ERM

Management accountants are asked to contribute in different ways to meet the needs of various stakeholders in their organizations. A large-scale survey study by Chang, Ittner, and Paz (2014) identified two areas in which accounting/finance professionals demonstrate different levels of effectiveness: a more typical area of contribution, which they labeled "reporting, compliance, control and risk" and another more strategic area of contribution, which they labeled "performance management." In our study, we examine the effectiveness of management accountants' contributions to both of these areas as they relate to ERM. We thus adapted the constructs used by Chang et al. (2014) to measure the management accountants' effectiveness in ERM areas ranging from compliance and statutory requirements to risk information for managerial decision-making.

Previous research has been at times critical of the influence of accounting as the knowledge base at the very origin of ERM (e.g., Power, 2009), because it induces an expectation that every risk event must follow the "logic of an

audit trail" (Power, 2009, p. 852). Management accountants might thus be perceived as less effective in areas that require risk scenario-imagining or imbuing the whole organization in a risk mindset. Alternatively, other researchers have highlighted that management accountants are in a position to promote risk management integration with decision-making for their organizations, because management accounting controls, risk management, and corporate governance are becoming increasingly interdependent. As Bhimani (2009) argued, it "is inadequate for firms simply to only deploy managerial controls which are considered to be effective. What is also essential is to make their deployment transparent" (p. 4). Management accountants can perform this role of making risk transparent by explicitly incorporating risk factors in typical management accounting tasks, such as budgeting and performance measurement (McNally & Tophoff, 2016).

The effectiveness of management accountants' contributions to ERM is a central element in the conceptual framework proposed in *Fig*. 1, and our empirical study investigated their effectiveness across a wide range of ERM areas: leading finance-related compliance programs; meeting fiduciary and statutory requirements; supporting, managing and mitigating risk; driving the integration of ERM with decision-making across the organization; strengthening internal controls; providing line managers with information regarding risks and consequences; implementing ERM for the accounting/finance function; evaluating and improving the organization's ERM processes; and analyzing and reporting the organization's performance, including its associated risks.

RESEARCH METHOD

We obtained the data for this study via a survey administered to members of the Institute of Management Accountants (IMA) during a Research Lab session at an IMA annual conference. We asked the management accountants in the study to provide information about their contributions to their organizations' risk management practices, characteristics of their organizations (size, industry), and personal demographic data.

Pilot Test

The questionnaire was pilot-tested with a group of senior-level accounting professionals attending a continuing education workshop led by one of the

authors. Their average age was 53 years, and they had on average 26 years of work experience, 13 with their current organization. Based on their feedback, we modified the sequence of questions, changed some wording to avoid confusion, and deleted less relevant questions to reduce completion time. The level of expertise of the accounting professionals who helped pilot-test the questionnaire, combined with their positive feedback on the instrument, reassured us that the questions captured relevant aspects of risk management practices.

Study Sample

Sixty-five management accountants completed the survey, and we offered a $10 Starbucks gift card to each participant as an incentive. It took the respondents about 20 minutes to finish the questionnaire. As shown in Table 1, the average age of the management accountants in the study was 47.5 years, their average work experience was 23.9 years, and 39.1% were female. Overall, the respondent pool consisted of very experienced professionals who mostly worked in the finance or accounting departments of their organizations. The size of the organizations included in the sample varied from less than $10 million to more than $10 billion in annual revenues, with the most common size between $10 million and $500 million in annual revenues.

Variables

Five-point Likert scales were used to measure the variables of interest in this study, corresponding to the various elements of the conceptual framework in *Fig. 1*: management accountants' contributions to both aspects of the ERM system, including risk management (nature of risk managed; risk likelihood; and risk impact) and internal control (roles played by management accountants in a range of ERM activities); the context in which these contributions take place, including ERM culture and information system (IS) support; and the effectiveness of such contributions in various areas of ERM activities.

Risk Management

Risk management was assessed in terms of risk nature, likelihood, and impact.

Table 1. Demographic Composition of the Sample.

Demographic Data		
Attribute	*Scale*	*Overall*
Number of Participants		65
Age	Years	47.5
Gender	Females %	39.1%
Work experience	Years	23.9
Years at current organization	Years	9.3
Yearly Revenue of organization:		
a) less than $10 million	Count	9
b) $10 million – $500 million	Count	28
c) $500 million – $10 billion	Count	11
d) more than $10 billion	Count	5
Industry:		
a) Manufacturing	Count	21
b) Non-Services*	Count	10
c) Education & Healthcare	Count	9
d) Media, Entertainment, Trade	Count	6
e) Government and Nonprofits	Count	7
f) Finance, Consulting, Real Estate	Count	13

*Construction, Mining, Agriculture, Transportation, Communication, Utilities, High Tech

Nature of Risk. We developed a 7-item scale (Table 2, Panel A) to measure the extent to which management accountants are involved in managing seven commonly known risks in an organization (compliance and legal; employee-related; market-price; credit and liquidity; operational; information technology and data security; reputation and strategic risks). This scale relates to the "Event Identification" component of COSO's ERM framework (COSO, 2004). Cronbach's alpha for this scale was 0.807.

Risk Likelihood and Impact. In order to measure risk likelihood and impact (Table 2; Panel B), we developed a scale informed by Merchant and Spaulding's (2012) field study on ERM implementation. This enabled us to run an ANOVA to compare the two dimensions of the 2x2 risk matrix (low/high likelihood vs. low/high impact), as shown in Table 3.

Internal Control

The contributions of management accountants to the internal control aspect of ERM were classified using an 8-item scale we developed to assess the

importance of their roles in a range of ERM activities, including prevention, monitoring, internal risk treatment, and external risk treatment (Table 4). This scale has two items for each of the four categories typically associated with the Cost of Quality framework (Ansari et al., 2004a; Datar & Rajan, 2014), and the Environmental Costing framework (Ansari et al., 2004b). This scale relates to the Control Activities component of the COSO ERM framework.

ERM Culture

In order to examine the organizations' risk management culture (Table 5; Panel A), we developed a 16-item scale ($\alpha = 0.945$) by adapting statements from a field study on the essential elements of a risk challenge culture identified by Walker et al. (2014). The risk management culture relates to the Internal Environment component of the COSO ERM framework.

IS Support

To measure the degree of IS support for the ERM system (Table 5; panel B), we developed a 5-item scale ($\alpha = 0.851$) based on the literature review by Grabski et al. (2011) that described the main risk areas where information systems can support accounting practice. This variable relates to the Information and Communication component of the COSO ERM framework.

Effectiveness

Finally, we measured the effectiveness of management accountants' contributions to ERM systems (Table 6) using a 9-item scale ($\alpha = 0.927$) that was based on a scale developed by Chang et al. (2014). They labeled the first three items as roles related to "reporting, compliance, and internal control/risk management," and the other six items as corresponding to the more strategic role of "performance management." We rephrased these items to reflect management accountant roles associated with risk management.

RESULTS

Risk Management

Risk Nature

Management accountants in the sample reported being involved in managing risks of different nature (Table 2, Panel A). The results show that

management accountants were highly involved with the management of "credit/liquidity" (3.85 out of 5) and "compliance/legal" risks (3.79). This is not surprising given that the increase in regulations (e.g., the Sarbanes–Oxley Act of 2002, the SEC's risk disclosure requirements) has shifted their attention to compliance-oriented risks. In addition, management accountants deal with management of operational risk (3.60) such as internal fraud or system/process failures. Using ANOVA we found differences among the ratings for the management accountants' involvement in managing risks of different nature ($p < 0.001$). Pairwise comparisons indicated these management accountants' involvement in managing credit/liquidity (3.85) and compliance/legal risks (3.79) was significantly higher than their involvement in the management of employee risk (3.29) and market price risk (2.84).

Table 2. Risk Management: Risk Nature, Likelihood, and Impact.

Panel A: To what extent does the information provided by Accounting/Finance contribute to your organization's management of the following types of risk?

Nature of Risk	Mean*	Standard deviation	Range
Credit/liquidity	3.85	0.99	1–5
Compliance/legal	3.79	0.98	1–5
Operational	3.60	0.93	1–5
IT/data security	3.48	1.11	1–5
Reputation/strategic	3.43	1.06	1–5
Employee	3.29	1.18	1–5
Market price	2.84	1.09	1–5
Overall	**3.47**	**1.09**	**1–5**

*1 = Very small extent, 5= Very large extent.

Panel B: How much does risk management in your organization focus on risks associated with the following types of events?*

		Impact						Likelihood total		
		Low			High					
		Mean	SD	Range	Mean	SD	Range	Mean	SD	Range
Likelihood	Low	2.46	0.96	1–4	3.56	0.88	2–5	**3.02**	1.07	1–5
	High	2.67	0.73	1–4	4.24	0.68	2–5	**3.46**	1.06	1–5
Impact Total		**2.57**	0.86	1–4	**3.90**	0.85	2–5			

*1 = Not at all, 5 = A great deal.

Risk Likelihood and Impact

The descriptive data, in Table 2, Panel B, reveal that the management accountants in the sample indicated that their organizations place more emphasis on risks that are perceived as having high impact in terms of cash consequences (3.90) versus low impact (2.57). The ANOVA results in Table 3 reveal significant main effects of both likelihood ($p < 0.001$) and impact ($p < 0.001$), with a significant likelihood × impact interaction ($p = 0.032$). As can be seen on Table 3, Panels A and C, the focus on high-impact risks that have a high likelihood of occurring (4.24) is significantly higher ($p < 0.001$) than the focus on high-impact risks that have low likelihood (3.56). However, when dealing with low-impact risks, the difference between high (2.67) and low (2.46) likelihood is not statistically significant ($p = 0.179$). This suggests that if a risk event has a low impact, then organizations give it the same low focus regardless of whether the risk is highly likely or not. If a risk event is expected to have

Table 3. Tests of Main Effects and Interaction – Level of Risk Management Focus.

Panel A: Descriptives

	Mean	Std. Deviation
Low likelihood/Low impact	2.46	0.96
High likelihood/Low impact	2.67	0.73
Low likelihood/High impact	3.56	0.88
High likelihood/High impact	4.24	0.68

Panel B: Analysis of variance (ANOVA)

Source of variation	*df*	Sum of squares	Mean square	*F*	*p*-value
Model*	3	117.882	39.294	58.146	0.000
Intercept	1	2423.542	2423.542	3586.254	0.000
Likelihood	1	11.700	11.700	17.313	0.000
Impact	1	103.520	103.520	153.184	0.000
Likelihood*Impact	1	3.145	3.145	4.654	0.032
Error	228	154.079	0.676		
Total	232	2703.000			

*$R^2 = 0.433$

Panel C: *T*-test of Risk Impact/Likelihood

	Avg. Difference	*t*	Significance
High Impact			
High likelihood – low likelihood	0.68	4.689	0.000
Low Impact			
High likelihood – low likelihood	0.21	1.354	0.179

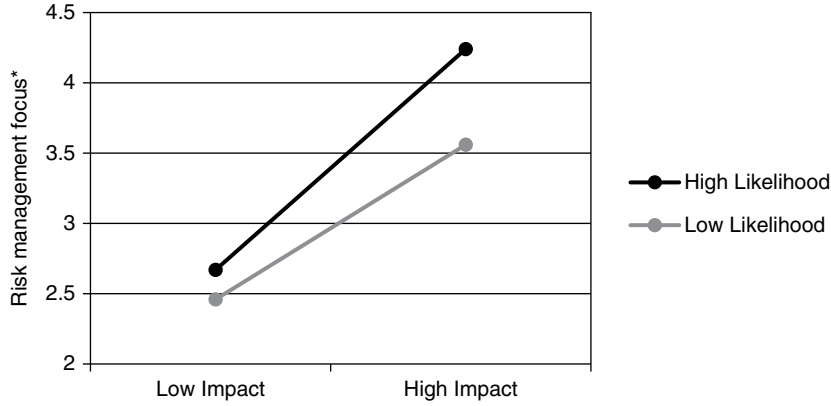

Fig. 2. Interaction between risk likelihood and impact. * 1 = not at all, 5 = a great deal.

a high impact, then the focus on risks perceived as having high-likelihood is significantly higher than on low likelihood risks. This significant interaction effect is shown in Table 3 (Panel B) and Fig. 2.

Internal Control

As seen in the descriptive results in Table 4, the management accountants we surveyed consider the importance of their ERM roles to be high in two categories of activities: risk prevention (3.73) and internal risk treatment (3.71). Therefore, management accountants are perceived as being actively engaged in prevention activities such as identifying risks, avoiding incidents, or reducing the likelihood and impact of events. In addition, they play an important role in correcting errors internally or reducing risk-related losses inside the organization. Risk monitoring received a rating of 3.61. Monitoring activities such as internal audits can help detect rule violations or fraudulent activities within the organization. Finally, external risk treatment received an average rating of 3.47. Even though management accountants may be involved in calculating the losses from external risk failures, many organizations have specialized functions such as public relations departments that work to mitigate the losses from external risks. These departments have the expertise to deal with attacks on a company's reputation when unforeseen activities harm a company's image. Overall, the management accountants in this study rate their role in managing these four types of risk-management activities (3.63) as being of significantly higher importance than 3 (the neutral answer in a 1–5 scale), $t(63) = 6.91$, $p < 0.001$.

Table 4. Internal Control: Management Accountants' Roles.

How important is the role that Accounting and Finance play in managing these risk management activities?			
ERM activities	Mean[a]	Standard Deviation	Range
Prevention			
• Identifying risks and avoiding incidents	3.73	0.97	1–5
• Reducing the likelihood of events and their impact in cost-efficient ways			
Monitoring			
• Assessing products and processes to ensure compliance with standards	3.61	1.03	1–5
• Monitoring activities to detect rule violations			
Internal risk treatment			
• Mitigating risk losses when things have already gone wrong inside the organization	3.71	1.01	1.1–5
• Correcting errors when internal events have already increased risk exposure			
External risk treatment			
• Responding to customers, regulators, or other external parties about risk failures that have already occurred outside the organization	3.47	1.03	1–5
• Mitigating loss of reputation or sales due to risk failures that have already occurred			
Overall	3.63	1.01	1–5

[a]1 = Not very important, 5 = Extremely important.

ERM Culture

A risk-challenging ERM culture has been shown to be a favorable context for effective risk management activities and internal controls. Management accountants in the study were asked about the extent to which their organizations' culture shared some of the characteristics of a risk challenge culture (Table 5; Panel A). Their organizations discuss "what-if" scenarios about potential risks (3.98), "approach risk with a questioning mind" (3.73), and "make critical assessments of the organization's ERM processes" (3.67). They also openly discuss risks in their organizations (3.63) and are comfortable with asking tough risk-related questions (3.66). These results suggest that risk is a frequently and openly discussed topic in the organizations in this study.

Table 5. ERM Context: ERM Culture and IS Support.

Panel A: Risk management culture[a]

To what extent do you agree with the following statements about your organization?

	Mean[b]	SD	Range
Ask 'what if' questions –risk scenarios	3.98	0.81	2–5
Approach risk with questioning mind	3.73	0.93	1–5
Make critical assessment of ERM processes	3.67	0.90	2–5
Comfortable with good/ bad news, asking tough questions	3.66	1.16	1–5
Discuss risks openly and frankly	3.63	1.07	1–5
Facilitate a free-flow of information re. RM activities	3.52	1.12	1–5
Leadership team sets tone for ERM	3.48	1.18	1–5
Assess and communicate the levels of risks that the organization is able to tolerate	3.42	1.07	1–5
Deliberate about potential risks in org. strategy and future opportunities	3.37	0.99	1–5
Diversity of skills and experiences for ERM	3.34	1.00	2–5
Assess and communicate the amount and types of acceptable risk to meet strategic objectives	3.30	1.09	1–5
Measure and assess risks regularly	3.27	1.16	1–5
Align mission with risk attitudes	3.25	1.11	1–5
Consider how incentives affect risks	3.23	1.02	1–5
Adjust for RM biases (loss aversion, overconfidence)	3.13	1.02	1–5
Prepare a formal RM report and submit it to the board of directors on a regular basis	2.80	1.43	1–5
Overall	**3.63**	**1.01**	**1–5**

[a]Statements truncated in this table due to space limitations.
[b]1 = strongly disagree, 5 = strongly agree.

Panel B: Information systems support.

To what extent has your organization implemented the following information system initiatives to address the structural complexity in Accounting and Finance?

	Mean[a]	SD	Range
Addressed information security concerns	3.94	0.93	2–5
Implemented standard chart of accts/info architecture	3.94	1.14	1–5
Developed systems that comply with IC requirements	3.56	1.05	1–5
Provided an enhanced audit support	3.50	1.17	1–5
Drove business process integration	3.14	1.22	1–5
Overall	**3.62**	**1.14**	**1–5**

[a]1 = strongly disagree, 5 = strongly agree.

IS Support

Another element in the context of effective ERM systems is the existence of sophisticated information systems that support the collection and reporting of risk-related information. Therefore, we asked the management accountants about the extent of implementation of various IS initiatives to support their accounting and finance functions in regards to risk management and internal controls (Table 5; Panel B). On a scale of 1 (strongly disagree) to 5 (strongly agree), management accountants in the study reported IS support ranging from 3.94 (initiatives "addressed information security concerns" and "implemented standard chart of accounts/standard information architecture") to 3.14 ("drove business process integration").

Effectiveness

Finally, we examined the perceived effectiveness of the contributions of management accountants not only in terms of overall contributions to ERM but also in specific areas of ERM. As shown in Table 6, the average rating the management accountants in this study gave to their overall ERM effectiveness

Table 6. Effectiveness of Management Accountants' Contribution to ERM.

How effective is Accounting/Finance in performing the following roles in your organization?	Mean[a]	Standard Deviation	Range
Meeting fiduciary and statutory requirements	4.23	0.82	1–5
Strengthening internal controls	4.02	0.98	1–5
Leading finance-related compliance programs	3.82	0.97	1–5
Supporting/managing/mitigating risk	3.61	0.88	2–5
Implementing RM for Accounting/Finance function	3.60	0.98	1–5
Analyzing and reporting the organization's performance including its associated risks	3.45	1.05	1–5
Evaluating and improving the organization's RM processes	3.35	1.16	1–5
Driving integration of RM with decision-making across the organization	3.29	1.06	1–5
Providing line mangers information regarding risks and consequences	3.25	0.99	1–5
Overall	**3.60**	**1.04**	**1–5**

[a]1 = Very ineffective, 5 = Very effective.

was 3.6 (on a scale of 1 = very ineffective, 5 = very effective). A *t*-test revealed that this overall effectiveness rating of 3.6 is significantly higher than the neutral rating of 3, $t(61) = 6.3$, $p < 0.001$.

They perceived their performance to range in effectiveness from 4.23 ("meeting fiduciary and statutory requirements") to 3.25 ("providing line managers with information regarding risks and their consequences"). Thus, these results suggest that management accountants in the study perceive their contributions as being highly effective in compliance-related areas.

CONCLUSION

Our study surveyed experienced management accountants to obtain empirical information about their contributions to ERM (both in terms of risk management and internal control), the context in which these contributions take place (in terms of ERM culture and IS support), and the effectiveness of such contributions.

In terms of risk management, the results indicate that the management accountants in the survey contribute highly to managing risks of a financial or compliance/legal nature. Furthermore, the management accountants in the study tend to focus mostly on risks they perceive as having potentially higher impact (in terms of monetary consequences) and a higher likelihood of occurring. However, when impact is perceived to be low, likelihood of occurrence does not seem to significantly influence the degree of risk management focus. In terms of the internal control aspects of ERM, the role played by management accountants is highly important for ERM activities related to prevention and internal risk treatment.

On average, the respondents reported that their organizations' ERM culture was characterized by openness to challenging discussions about risk. Consistent with these observations, their organizations had implemented IS support for the work of management accountants in areas such as information security and standardized information architecture.

Overall, the results suggest that the effectiveness of management accountants' contributions to ERM is perceived to be high in the areas of compliance and finance-related risk.

In addition to these empirical findings, the study also offers methodological contributions. We developed a COQ-informed taxonomy and a corresponding scale to examine the ERM activities of management accountants in terms of four categories of roles (Prevention, Monitoring, Internal Risk Treatment, and External Risk Treatment). We built on the concept of "risk challenge culture" that emerged from the research commissioned

by ACCA/IMA (Walker et al., 2014, 2015), and we proposed a new scale to measure it.

Limitations of the study include its somewhat limited sample size and its reliance on mostly self-reported variables. These limitations reflect the cost/benefit tradeoffs we faced by deciding to collect data from experienced management accountants. On the one hand, having this sample of seasoned professionals strengthened our results. However, this choice also constrained sample size, and therefore, may limit the generalizability of the survey results.

Notwithstanding these limitations, our findings suggest several directions for future research, practice, and education. Risk management researchers could investigate the interactions between risk management and internal controls, for example, do organizations that focus on potential risk impact tend to design internal controls that emphasize external risk treatment, as opposed to prevention? Future studies can explore in greater detail the antecedent factors that lead to role importance for management accountants in the areas of prevention, monitoring, internal and external risk treatment, and further test the properties of this classification model. Our inclusion of ERM culture may also be a topic of investigation of antecedent factors. In addition, alternative taxonomies or ERM culture scales may be tested so that practitioners can use these results to improve their effectiveness in performing ERM roles.

Practicing management accountants may use our results as a confirmation of the importance of their roles in ERM practices. The results also encourage a systematic effort to develop more sophisticated mechanisms to collect and disseminate ERM information, such as estimated likelihood and impact of risks, in order to improve decision-making throughout the organization. Even when risk impact is estimated to be small, in terms of monetary consequences, management accountants should remind line managers of the potential cumulative risks of many low-impact events occurring at once. While management accountants have achieved significant success in revamping performance management systems, including the use of non-financial measures in the last two decades, the integration of risk information with performance management and budgeting systems may become a necessary next step in the years ahead. As highlighted in a thought paper by the International Federation of Accountants, only organizations that can achieve this integration will be able to fully reap the benefits of risk management: "an effective risk management supports management's attempts to make all parts of the organization more cohesive, integrated, and aligned with its objectives, while operating more effectively, ethically, and legally" (IFAC, 2015, p. 10).

In terms of management accounting education, our study suggests that ERM is not purely a technical field but depends on an organizational culture that encourages open discussions about risks, "what-if" scenarios and critical assessments of ERM processes. A joint task force of the American Accounting Association and the IMA has recommended that ERM should be included in accounting curricula as a "broad management competency" (Brewer, Sorensen, & Stout, 2014; Lawson et al., 2014). It is important that ERM educators cover topics related to cultural awareness and transformation, as well as training on critical thinking related to ERM threats and opportunities.

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