Risk-based internal audit: Factors related to its implementation

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Abstract

Purpose: This study empirically investigates the factors associated with the implementation of risk-based internal audit (RBIA).

Design / Methodology / approach: As a first step, a literature review of the relevant literature is performed, and five potential factors related to the implementation of risk-based internal audit are identified. Based on that, we construct a questionnaire survey sent out in November 2019 to 185 internal auditors, executives, and accountants in Greece to receive 90 responses. Multiple regression analysis is conducted to identify the factors related to the implementation of RBIA.

Findings: We show that there is a statistically significant positive relationship between the implementation of RBIAand1) the provision of risk management training, 2) an active audit committee role, and 3) the establishment of a formalized risk management system.

Practical Implications: The results have important implications for internal auditors, chief executive officers and accountants who wish to enhance internal audit effectiveness and the accuracy and quality of financial information.

Originality / Value: Empirical studies on the factors related to the implementation of risk-based internal audit are rare. This is the first study to create empirical variables based on a thorough review of the relevant literature to empirically investigate the factors that are related to the implementation of RBIA in an emerging economy. By focusing on the Greek context, this study also sheds light to other countries with similar CG systems, thus providing insights to settings where the Type II agency problem exists (La Porta *et al.*, 1999).

Keywords: risk-based internal audit, internal audit, Greece, risk management, auditing

1. Introduction

Corporate bankruptcies highlighted deficiencies in corporate governance, financial reporting, and timely detection of threats to business strategies (Drogalas *et al.*, 2020a, b; Grant and Visconti, 2006; KPMG, 2007).On that basis, there is growing evidence with regard to the effects of internal audit on corporate governance (Al Qadasi and Abidin, 2018; Myers and Ziegenfuss, 2006; Ridley *et al.*, 2011;Vadasi *et al.*, 2020).Part of this evidence illustrates that internal audit function may contribute to corporate governance and the quality of financial reporting process (Abdeljawad et al., 2020; Ebaid, 2011; Koutoupis *et al.*, 2018).

In the same vein, there was a shift in internal audit focus from processes to business risk, turning the latter into a cornerstone of corporate governance (Benli and Celayir, 2014; Carcello*et al.*, 2005; Dinçer and HasiğluÜmit, 2017; Hafizah, 2017; IIA, 2009; McNamee and McNamee, 1995). At the same time, changes in regulatory frameworks and the introduction of new standards of internal audit, risk management, and corporate governance required the interdependence of internal audit and risk management through the use of a systematic and structured audit methodology, i.e. risk-based internal audit (Chapman and Anderson, 2002; Jankensgård, 2019; Koutoupis *et al.,* 2009;Van Peursem, 2004; Wilkinson and Coetzee, 2015).

Risk-based internal audit involves assessing an organization's overall risk management framework in order to investigate the extent to which the board of directors and management determine, assess, manage, and monitor risks (IIA, 2014; Spira and Page, 2003),establish a control environment, assess risk exposure level (Lindow and Race, 2002), create a risk-based control plan, with the aim of meeting the needs of the organization (Coetzee and Lubbe, 2014; Selim and McNamee, 1999),and conducting annual and periodic audits to finally communicate audit results to the audit committee, the board and the management in a timely manner (Anderson and Dahle, 2006; Jackson, 2005).

Understanding business objectives and strategies and aligning them with business objectives and activities (Coetzee and Lubbe, 2014; Selim and Mc Namee, 1999b) as well as assessing business risks on an annual basis and in individual audit assignments (Allegrini and D 'Onza, 2003; Koutoupis and Tsamis, 2009) - that is, identifying, measuring and prioritizing the negative effects for the entity - contributes to an effective risk management that follows a holistic approach at the lowest possible cost (Bowling and Rieger, 2005; Bunham, 2004; Busman and Zuiden, 1998; Goodwin, 2003; Griffiths, 2006; Gupta, 2011;Lois*et al.*, 2020; McCord, 2002; Verschoor, 2006). Therefore, the focus of internal auditors is shifted to the future (Crawford and Stein, 2002; Petridis *et al.*, 2019) and to "high-risk" areas that must be considered as a priority when preparing the internal audit plan (Griffiths, 2006; Hafizah, 2017; Koutoupis and Tsamis, 2009; Sarens *et al.*, 2012). In order to achieve the above, internal auditors, who now play a strategic role in organizations (IIA, 2014; Krogstad *et al.,* 1999), are required to possess specialized knowledge in matters of control and risk management (Deloitte, 2012; Mayur *et al.*, 2017; Zain *et al.*, 2006).

It becomes clear that the implementation of risk-based internal audit goes beyond the limitations of compliance audits, operational effectiveness and the reliability of financial statements (Colbert and Alderman, 1995). This is because it relies on the assessment of organizational objectives, risks, and audits (Rivenbark, 2000) and allows the provision of assurance regarding the effectiveness and efficiency of risk management and internal control operations (Castaheira *et al.*, 2010; COSO, 2004;Spira and Page, 2003) leading to a more efficient allocation of audit resources (Spadaccini, 2010) and continuously increasing the added value of the internal audit function (Bou-Raad, 2000; Griffiths, 2006; Sheehan, 2010) by upgrading the quality of audit work, improving operational performance, and contributing to the sustainability and long-term development of organizations (Danescu *et al.*, 2010; Hermanson and Rittenberg, 2003; Sarens*et al.*, 2009; Sheehan, 2010; Staciokas and Rupsys, 2005).

Although a number of international studies have been conducted on the broader role of internal audit at the organizational level (Abdolmohammadi, 2009; Khongmalai *et al.,* 2010; Melville, 2003; Selim et al., 2003, 2009) and its relationship to business risk management (De Zwaan *et al.*, 2011; Drogalas and Siopi, 2017; Gramling and Mayers, 2006; Karagiorgos *et al.*, 2010), there is a paucity of literature on factors related to the implementation of risk-based internal audit. Previous studies had focused primarily on risk assessment processes during audit planning (Allergini and D'Onza, 2003; Castanheira *et al.*, 2010; Koutoupis and Tsamis, 2009). In addition, some studies provide theoretical models for implementing risk-based internal audit (Coetzee and Lubbe, 2014) while few of them associate the application of risk-based internal audit with organizational performance (Kirgogo *et al.*, 2014) as well as with specific organizational factors (Hafizah, 2017).

Our paper makes several novel contributions to the corpus of literature on risk-based internal audit. First, new empirical evidence regarding an emerging economy is provided.

This contributes towards a better understanding of the factors that are related to the implementation of risk-based internal audit. In addition, by focusing on Greek context this study sheds light to other countries with similar CG systems (see, La Porta *et al.*, 1999).This is quite interesting since our study provides insights to settings where the Type II agency problem exists.

The rest of the paper proceeds as follows. Section 2 presents a literature review to identify potential factors related to the implementation of risk-based internal audit based on which the research hypotheses are developed. In section 3 the research methodology is described, followed by the empirical results in section 4. Finally, the conclusions, research limitations, as well as suggestions for future research are discussed in section 5.

2. Literature review and motivation of hypotheses

2.1 Risk-based internal audit

Risk-based internal audit (IA) increases the effectiveness and efficiency of IA as it requires a greater understanding of its processes in order to adequately meet stakeholder expectations (Castanheira *et al.*, 2010). The implementation of risk-based IA, which focuses on risk management, ensures that inherent risks threatening strategic objectives are identified and evaluated in a timely manner and that the risk management system and the internal control system function properly. In this way, efficient allocation of audit resources is achieved, and the quality of the data gathered is enhanced, with fewer audit processes having been performed (Coetzee and Lubbe, 2014). Focusing on business risk provides organizations with greater coverage against risk, provided that structured risk assessment processes are adopted that include all types of organizational procedures, structured internal audit planning techniques and periodic assessment of the effectiveness of risk management processes and internal audit (Khanna and Kaveri, 2008; Koutoupis and Tsamis 2009).

2.2 The role of the internal auditor in risk management

It is widely accepted that internal audit, which has been shown to be positive and significantly related with risk management, has evolved to become risk-based internal audit (Drogalas and Siopi, 2017). Although the role of internal auditors varies across countries and appears to be linked to the efficiency of the risk management system, the focus on improving internal auditing increases control awareness and creates a more formalized risk management system (Abidin, 2017; Sarens and De Beelde, 2006b). Internal auditors contribute to the organization's well-being by conducting audits and including risk assessment findings in the annual audit plan. In particular, internal auditors need to identify inherent risks in operational and strategic activities in order to adjust audits accordingly (Allegrini and D'Onza, 2003). Focusing on strategic risks and delivering timely insights on these risks to senior management helps internal audit to add value to the business (Metric Stream, 2018). A key requirement is the performance of broad-based audits by internal auditors, who must recognize and understand strategic objectives and the objectives of critical business functions (Abdullatif and Kawuq, 2015; IIA and CBOK, 2015). Recent research by KPMG and the Singapore Accountancy Commission (2013) and Metric Stream (2018) suggests that internal auditors should emphasize the adequacy and effectiveness of risk management and internal control systems, with the aim of increasing risk awareness, aligning internal audit with operational strategy, improving control processes and increasing the efficiency of the organizations' operations. Based on the above, we hypothesize that:

H1:There is a positive relationship between the role of internal auditors in risk management and the implementation of risk-based internal audit.

2.3 Provision of risk management training

Given the interdependence of internal audit and risk management that results from the implementation of risk-based internal audit, the provision of risk management training allows internal audit to add value to organizations by creating an audit universe that focuses on risk management. In this way, internal auditors are able to understand the factors influencing corporate performance, identify potential sources of risk and involve line managers to ensure the correct implementation of their suggested recommendations (Arena and Azzone, 2009). In addition, internal auditors' lack of proper training and adequate qualifications prevents them from assuming new roles and additional responsibilities, which, in turn, reduces the quality of internal audit and risk management processes, namely, the provision of assurance and consulting services regarding monitoring, assessing and improving these processes (Ebaid, 2011a, 2011b). Further, risk management training allows for the formation of correct perceptions regarding the detection and assessment of risks (e.g. fraud detection), contributing to the proper implementation of RBIA, as the latter is a structured, consultative method of internal audit (Abdullah and Al-Araj, 2011; Ar'Reza et al., 2020). Rae and Subramaniam (2008) find that one of the key organizational factors that are significantly and positively related to the quality of an organization's internal control procedures is the extent of risk management training of staff. It does make sense that staff that receives risk management training are likely to more accurately identify threats to the organization emerging from weaknesses in internal controls (Kramer, 2003). Based on the above, the following research hypothesis is formulated:

H2: There is a positive relationship between risk management training and the implementation of RBIA.

2.4 Audit Committee with an active role

In the rapidly evolving business environment, audit committee (AC) role has expanded to include risk assessment to ensure AC effectiveness in terms of reviewing, approving and assessing audit plans, while increasing the value-adding IA function of modern companies. A recent survey by KPMG (2017) found that, on top of focusing on compliance and the submission of financial reports, 56% of surveyed AC executives wanted internal audit to focus on risk management as well. The degree of internal audit in the business risk management system is critically influenced by the pressure exerted by the audit committee in this direction. In particular, the audit committee must periodically monitor the activities of the internal audit function, thus facilitating the implementation of risk-based internal audit (Beasley *et al.*, 2006). Additionally, the active participation of AC executives promotes the implementation of risk-based internal audit. More specifically, an active audit committee oversees the full spectrum of internal auditing activities so as to ensure that IA covers all areas of an organization. This illustrates that an active audit committee may meet more often to address internal control and financial reporting issues (Barua *et al.*, 2010).At the same time, it requires timely provision of reliable information on risk management and internal audit mechanisms, ensuring that the existing safety nets and action plans are sufficient for the identification and mitigation of business risks (Hafizah, 2017).Based on the above, the following research hypothesis is formulated:

H3: There is a positive relationship between an active audit committee role and the implementation of risk-based internal audit.

2.5 Establishment of formalized Enterprise Risk Management (ERM)

The establishment of a standardized risk management system helps identify potential risks and facilitates audit planning, as it raises risk awareness within the organization (Coetzee and

Lubbe, 2014).As Koutoupis and Tsamis mention (2009), different Laws (e.g. Sarbanes Oxley Act, 2002), corporate governance codes and control frameworks are stressing the need for establishing adequate and effective risk management systems. It is only in a control environment such as this that internal audit can facilitate and monitor risk management processes, as well as help the management identify risks that threaten the organization's strategic objectives and internal audit planning mechanisms aimed at improving business performance (Woods, 2007). Of course, the establishment of a risk management system presupposes that the role of internal auditors and risk managers is sufficiently well defined or, better yet, that separate internal audit and risk management sections are established, where responsibilities and duties are clearly laid out (Crawford and Stein, 2002).On that basis, Ayagre (2014) illustrates that there is high involvement of risk-based internal audit in risk management. Based on the above, the following research hypothesis is formulated:

H4:There is a positive relationship between the establishment of formalized risk management system and the implementation of risk-based internal audit.

2.6 Establishment of a formalized internal control system

RBIA seems to be linked to the establishment of a formalized internal control system, which also promotes an auditing culture in the organization. To put it differently/in other words, audit and internal control system designed to secure accountability (Spira and Page, 2003). More specifically, the internal control system influences the focus of internal audit in terms of improvement suggestions regarding risk management and activities raising control awareness (Fernandez-Laviada, 2007; Sarens and De Beelde, 2006a). Further, the degree of standardization of internal control mechanisms, which must be monitored on an ongoing basis, as well as the way in which management addresses issues related to risks and internal audits, influences risk and control awareness, given that the latter affects the audit committee's need for comfort but also the ways in which internal audit can provide it (Sarens *et al.*, 2009).Based on the above, the following research hypothesis is formulated:

H5: There is a positive relationship between the establishment of a formalized internal control system and the implementation of risk-based internal audit.

3. Research Methodology

3.1 Research Design

To empirically examine our hypotheses, we collected data through a structured closed-ended questionnaire that we designed based on a thorough review of the relevant literature, on which the hypotheses were motivated. The questionnaire was deemed to be the most appropriate method to collect data, as we wanted to survey people from inside the organizations on topics for which data could not be readily found on any existing database. Other studies on this topic discussed in this paper are also using questionnaires to collect data (Castanheira et al., 2010).

The questionnaire consists of seven sections that were based on variables from the relevant literature (Table 1), namely, RBIA, internal auditor role in risk assessment, risk management training, AC role, formalized ERM and formalized internal control system and demographics. The questionnaire questions are presented in Section 4 along with the results.

The questionnaire was distributed online during November 2019–January 2020 to a sample of 185 internal auditors, chief executive officers and accountants from companies in Greece of which 90 responded.

3.2 Variable creation and description

To be used in our multiple regression analysis model, all variables were converted to continuous ones by determining the mean in each questionnaire section. In this way, we created the dependent variable "RBIA" and the following five independent variables, namely, "internal auditor role in risk management," "provision of risk management training," "active AC role in risk management," "establishment of formalized ERM" and "establishment of formalized internal control system."

The description of variables and the literature based on which the hypotheses pertaining to each variable is motivated are displayed in Table 1, which highlights the relationship of our regression model to prior literature.

The dependent variable representing the degree at which risk-based internal audit (RBIA) is implemented was evaluated based on the degree to which RBIA allows internal audit to meet shareholder expectations, contributes to a better understanding and periodic assessment of internal audit processes, as well as the degree to which RBIA leads to a more efficient allocation of internal audit resources.

The first independent variable measuring the degree in which the internal auditor has a role in risk management was evaluated based on six indicators related to the understanding of strategic objectives, the comprehension of critical operational objectives, the inclusion of risk assessment findings in IA annual planning, the assessment of inherent risks threatening the objectives of critical business functions and the subsequent adjustment of audits, timely provision of information to senior management regarding threats to the organization's sustainability, and the assessment, evaluation and issuing of reports relating to the adequacy and effectiveness of risk management and internal control system.

The second independent variable measuring the degree at which risk management training is provided was evaluated based on three indicators related to the creation of an audit universe that relies on risk management and the formation of correct perceptions regarding the identification and evaluation of business risks, as well as the enhancement of internal audit quality and risk management quality.

The third independent variable measuring how active is the role of the audit committee in risk management was evaluated based on four indicators that measured the degree to which AC controls, approves and evaluates audit plans, periodically monitors IA activities to ensure they cover all areas of an organization, takes into account information regarding operational risks and control mechanisms and actively supports IA focus on critical business functions and the adequacy of risk management system processes.

The fourth independent variable measuring the degree at which a formalized enterprise risk management system exists was evaluated based on three indicators that measured the degree to which processes and responsibilities of the risk management system are clearly identified within the organization, the existence of a risk manager or a separate risk management section within the organization, and the establishment of a standardized risk management system.

Finally, the dependent variable measuring the degree at which a formalized internal control system is established was evaluated based on three indicators that measured the establishment of effective control mechanisms that have been formalized by management in order to identify and eliminate all business risks, the formation of a culture that raises control awareness within the organization, and the continuous monitoring of internal control system.

---INSERT "Table 1: Variables and the literature on which they were based upon" HERE ---

4. Results

4.1 Descriptive statistics

4.1.1 General

Descriptive statistics based on demographic questions concerning the organization's basic activity, and the respondents' position, educational level and experience in years is presented in Table 2.

---INSERT "Table 2: Demographic profile and descriptive statistics of the respondents" HERE ---

As shown in Table 2, the majority of participants (55.6%) work in the services industry, whereas 24.4% are employed in commercial ones. Most of the respondents are internal auditors (54.4%) or managers (17, 8%) and 70% have a Master's degree, as opposed to 21.1% who are upper secondary education graduates. In terms of experience, 41.1% of the study participants have 8 or more years of audit experience, 30% have 5-8 years and 28.9% have a limited experience of 1-4 years.

4.1.2 Risk-based internal audit

Table 3 contains descriptive statistics regarding Risk-Based Internal Audit

---INSERT "Table 3: RBIA descriptive statistics" HERE ---

The results displayed in Table 3 are considered particularly encouraging, as all of the respondents either agree "to a very great extent" (34.4%) or "to a great extent" (62.2%) with the postulate that the implementation of risk-based internal audit allows for a better understanding of internal audit processes. Similarly, the vast majority of the participants (90.0%) believe that RBIA implementation allows for periodic assessment of internal audit processes, with 56.7% of them agreeing "to a great extent" and 33.3% agreeing to a "very great extent" with the former statement. In addition, 51.1% of the respondents hold that the implementation of risk-based internal audit enables internal audit function to meet stakeholder expectations "to a great extent", while 42.2% believe that it contributes to a more efficient allocation of internal audit resources "to a very great extent".

4.1.3 Internal auditor role in risk management

Table 4 displays descriptive statistics related to the enhanced role of internal auditors in risk management.

---INSERT "Table 4: Descriptive statistics on the internal auditor role in risk management" HERE ---

Table 4 shows that 87.8% of participants believe that the implementation of risk-based internal audit allows IA to meet the expectations of stakeholders, with 51.1% of the respondents agreeing "to a great extent" and 36.7% agreeing "to a very great extent" with said statement. In the same vein, 83.3% of study participants believe that RBIA implementation leads to a more efficient allocation of internal audit, with 41.11% agreeing "to a great extent" and 42.22% agreeing "to a very great extent" with the posit. In addition, 57.8% of respondents believe that internal auditors provide timely information to senior management regarding risks that threaten the viability of organizations "to a great extent" and 60% of them believe that internal auditors monitor, assess, and report on the risk management system's adequacy and effectiveness to a great extent. Finally, 47.8% of the respondents claim that internal auditors monitor, assess, and report on the adequacy and effectiveness of the internal audit system to "a great extent".

4.1.4 Risk management training

Table 5includes descriptive statistics linked to the provision of risk management training.

---INSERT "Table 5: Descriptive statistics regarding risk management training" HERE ---

From Table 5 we see that the vast majority of respondents (93.3%) believe that risk management training facilitates the creation of an audit universe based on risk management, with 52.2% of them agreeing with the statement to a "very great extent" and 41.1% "to a great extent". Moreover, 48.9% of the participants believe that risk management training contributes to the formation of correct perceptions regarding the detection and assessment of business risks "to a great extent". Finally, a whopping 95.6% believe that risk management training increases the quality of internal audit and risk management processes, with 40% of the respondents supporting the view to "a great extent" and 55.6% "to a very great extent".

4.1.5 Active audit committee role

Table 6 contains descriptive statistics related to the active audit committee role.

---INSERT "Table 6: Descriptive statistics regarding active audit committee role" HERE ---

Table 6 shows that the majority (88.9%) of the participants believe that the audit committee reviews, approves and assesses audit plans either "to a great extent" (55.6%) or "to a very great extent" (33.3%). Similarly, 85.6% of the survey respondents believe that the audit committee periodically monitors internal audit activities to ensure they cover all areas of the organization, with 48.9% agreeing with the statement "to a great extent" and 36.7% "to a very great extent". In addition, 58.9% are of the opinion that the audit committee takes into account information on operational risks and control mechanisms in the performance of its duties and 57.8% consider that it actively supports the focus of internal audit on critical operational risks and the adequacy of risk management processes "to a great extent".

4.1.6 Establishment of formalized enterprise risk management (ERM)

Table 7 incorporates descriptive statistics related to the establishment of a formalized risk management system (ERM).

---INSERT "Table 7: Descriptive statistics regarding the establishment of formalized enterprise risk management (ERM)" HERE ---

As shown in Table 7, 40% of the respondents consider risk management processes and responsibilities to be clearly defined within the organization "to a great extent" and 33.3% "to a moderate extent". Further, a mere 55.5% of the respondents report the existence of a risk manager or a separate business risk management section within the organization, with 24.4% of them agreeing "to a great extent" and 31.1% "to a very great extent" with the previous statement. Finally, 47 out of 90 respondents either report the complete absence of a standardized risk management system within the organization (6.7%), or its existence "to a small extent" (8.9%) or "a moderate extent"(36.7%). In contrast, 43 out of 90 respondents claim that a standardized risk management system is in place within the organization, with

26.7% of them agreeing with the statement "to a great extent" and 21.1% "to a very great extent".

4.1.7 Establishment of a formalized internal control system

Table 8 presents descriptive statistics related to the establishment of a formalized internal control system. Results suggest there is significant room for improvement.

---INSERT “Table 8: Descriptive statistics regarding the establishment of formalized internal control system” HERE ---

As Table 8 shows, 52.2% of the respondents claim that effective control mechanisms have been formalized by management in order to identify and eliminate all business risks, either "to a great extent" (41.1%) or "to a very great extent" (11.1%). Further, 54.4% of the study participants did not find that a strong awareness culture had been established within the organization, with 2.2% reporting its absence, and 14.4%believing a control awareness culture had been established "to a small extent" or "to a moderate extent” (37.8%). Finally, the majority of respondents, i.e. 64.4%, state that internal control system is monitored on an ongoing basis either "to a great extent" (43.3%) or "to a very great extent" (21.1%).

4.2. Multiple regression analysis results

To apply multiple regression analysis all variables were converted to continuous ones by determining the mean in each questionnaire section that corresponded to each variable.

The main criteria for the application of regression analysis are the correlation of the dependent variable with the independent variables and the absence of strong correlations between variables (Katsis *et al.*, 2010). Table 9 shows the correlations between the independent and dependent variables, which, however, are not very high and do not act as a deterrent to the application of regression analysis.

---INSERT “Table 9: Correlations” HERE ---

The results of the regression analysis are presented in Table 10. An Analysis of Variance (ANOVA) gives an F of 5.525 with a p-value of 0.000 which indicates that at least some of our model’s independent variables contribute to the interpretation of the variability of the independent variable. The R-square adjusted of the model is 20.3%.

---INSERT “Table 10: Regression analysis results” HERE ---

According to the regression results of Table 10, H1 is rejected as the variable representing the enhanced role for the internal auditors in risk management is not statistically significant. H1, H2, and H3 are not rejected; regression results show that there is a statistically significant positive relationship at the 0.01 level between the implementation of risk-based internal audit and the provision of risk management training (H2), an active audit committee role at the 0.05 level (H3), and the establishment of a formalized risk management system at the 0.05 level (H4). Finally, the variable pertaining to H5 and representing the establishment of a formalized internal control system is not statistically significant, therefore H5 is rejected.

5. Conclusions

The modern business environment requires the establishment of an effective internal audit function so as to avoid inadequacies regarding corporate governance issues, financial reporting but also in order to understand and identify risks that threaten business objectives and strategies (Benli and Celayir, 2014; De Zwaan *et al.*, 2011; Drogalas and Siopi, 2017; Drogalas *et al.*, 2020a; Grant and Visconti, 2006; Karagiorgos *et al.*, 2010; Koutoupis *et al.*, 2009; KPMG, 2007; Lemon and Tatum, 2003).

The implementation of risk-based internal audit as a modern methodology in the field of auditing effectively achieves the interconnection of internal audit and risk management - functions previously considered independent (Coetzee and Lubbe, 2014; Hafizah, 2017; Van Peursem, 2004;Wilkinson and Coetzee, 2015). This study empirically analyzes the variables associated with the implementation of risk-based internal audit in organizations in Greece.

The empirical research that was carried out led to a number of important conclusions. First of all, as seen in the demographic analysis, the majority of the participants are internal auditors and directors of internal audit departments in companies mainly operating in the service sector. It is noteworthy that most of them have a Master's degree and eight or more years of experience, which shows that engaging in the field of internal auditing requires specialized knowledge and experience.

Regarding the implementation of risk-based internal audit, results were particularly encouraging, mainly in terms of how respondents perceived the contribution of RBIA to the understanding of internal audit processes, since the latter, according to Khanna and Kaveri (2008), facilitates proper implementation of risk-based internal audit. In addition, most Greek companies appear to be focusing on the periodic assessment of internal audit processes- and thus strengthening internal audit activity - a finding similar to the conclusions reached by Koutoupis and Tsamis (2009). Contrary to the findings of Castanheira *et al.* (2010), internal audit in Greece seems to be geared towards meeting all stakeholder expectations, even though this is not always optimally achieved. Finally, as mentioned by Coetzee and Lubbe (2014), even though the implementation of risk-based internal audit seems to lead to efficient allocation of internal audit resources, there is considerable scope for improvement.

As far as the role of internal auditors in risk management is concerned, although it seems satisfactory, the need to further strengthen it is evident. More specifically, most organizations perform audits that place particular emphasis on assessing inherent risks involved in critical business functions, while risk assessment findings are also taken into account during the annual internal audit planning -a finding also confirmed by Allegrini and D'Onza (2003). Contrary to what Abdullatif and Kawuq (2015) found, internal auditors in Greece seem to understand the objectives of critical business strategies and functions to a satisfactory level, even though there seems to be significant room for improvement.

Further, although in most organizations internal auditors inform senior management about risks that threaten the viability of the entity, more emphasis should be placed on this area, as MatriStream's (2018) research suggests. In addition, significant improvements are being made to monitor, assess, and report on the adequacy and effectiveness of risk management and internal control systems, so that internal audit can fulfill its new expanded role by raising control awareness and supporting a transparent and reliable risk management system (KPMG and Singapore Accountancy Commission, 2013; MetriStream, 2018; Sarens and De Beelde, 2006b).

Results regarding the provision of risk management training are in contrast with the findings of Arena and Azzone (2009), Abdullah and Al-Araj (2011) and Ebaid (2011). More specifically, the view that risk management training is conducive to the creation of an audit universe that focuses on risk management, the formation of correct perceptions regarding risk management, and the increased quality of IA and risk management processes, all of which facilitate proper implementation of risk-based internal audit, seems to have been well-established in Greece.

With regard to the audit committee, results were consistent with those of Beasley *et al.* (2006) and Hafizah (2017), since the AC appears to be effective in reviewing, approving and assessing audit plans, it is found to place emphasis in the periodic assessment of internal audit activities and it seems to take into account information regarding risks and control mechanisms, a finding which is also consistent with research carried out by the KPMG (2017) network. However, there seems to be some room for improvement when it comes to supporting IA focus on critical risks and on the adequacy of risk management processes, as these are required for the proper implementation of risk-based internal audit.

Moreover, it appears that roughly only one in two organizations in Greece have adequate procedures in place to facilitate the establishment of a standardized risk management system. It is clear that significant improvements need to be made to clearly identify the responsibilities and processes of the risk management system through the existence of a risk manager or an independently operated risk management section, so as to avoid overlaps and gaps, as Crawford and Stein (2002) point out, but also in order for internal audit to ultimately facilitate risk management (Woods, 2007).

Last but not least, results regarding the establishment of a formalized internal control system fit with those of Sarens *et al.* (2009), as they underline the ineffectiveness of control mechanisms established to identify risks as well as the absence of a strong control environment in about half of the organizations. However, the continuous monitoring of the internal control system in most organizations is a positive finding. It becomes clear that greater focus should be placed on improving internal control mechanisms and establishing an environment that focuses on control and risk (Fernandez-Laviada, 2007; Sarens and De Beelde, 2006a).

Additionally, multiple regression analysis revealed that the implementation of risk-based internal audit is positively and significantly related with an active audit committee role and the establishment of a formalized risk management system -which is in line with Hafizah's (2017) findings – but it is also linked to the provision of risk-management training. In contrast, the implementation of risk-based internal audit is not significantly related to the active participation of internal auditors in risk management and the establishment of a formalized internal control system. The results have important implications for internal auditors, chief executive officers and accountants who wish to enhance internal audit effectiveness and the accuracy and quality of financial information.

This research does have some limitations that provide opportunities for future research. To strengthen the generalizability of the findings, given that all respondents come from Greek companies, more research needs to be conducted on the factors related to the implementation of risk-based internal audit in other countries with different cultures and regulatory frameworks so that other variables that might be related with the implementation of risk-based internal audit can be understood – both in advanced and emerging economies. Finally, future research could examine whether results vary by industry/sector of activity.

In conclusion, the present empirical research, in line with the literature review, highlights the importance of the implementation of risk-based internal audit, which is a structured audit methodology that facilitates IA's provision of consulting services and assurances as to the effectiveness of proper risk management and the internal control system, the responsibility of which must remain with the management of the organizations.

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Table 1: Variables and the literature on which they were based upon

Type	Variable	Source
Independent	**Risk-based Internal Audit (RBIA) Implementation**	Khanna and Kaveri, 2008; Koutoupis and Tsamis, 2009; Castanheira*et al.,*2010; Coetzee and Lubbe, 2014.
Dependent	Internal Auditor Role in Risk Management	Allegrini and D'Onza, 2003; Sarens and De Beelde2006b; KPMG and SAG, 2013; Abdullatif and Kawuq, 2015; IIA and CBOK 2015; Drogalas and Siopi, 2017; MetricStream, 2018.
Dependent	Provision ofRisk Management Training	Arena and Azzone, 2009; Ebaid, 2011; Abdullah and Al-Araj, 2011.
Dependent	**Active Audit Committee Rolein Risk Management**	KPMG, 2017; Beasley et al., 2006; Hafizah, 2017.
Dependent	Establishment of Formalized Enterprise Risk Management (ERM)	Woods, 2007; Crawford and Stein, 2002.
Dependent	Establishment of Formalized Internal Control System	Sarens and De Beelde, 2006a; Fernandez-Laviada, 2007; Sarens*et al.,* 2009.

Table 2: *Demographic* profile and *descriptive statistics* of the *respondents*

		Frequency	Percent
Basic Activity	Commercial	22	24.4
	Industrial	9	10.0
	Services	50	55.6
	Other	9	10.0
Position	Accountant	9	10.0
	Internal Auditor	49	54.4
	Employee	10	11.1
	Department Manager	2	2.2
	Manager	16	17.8
	Other	4	4.4
Educational Level	Upper Secondary Education	4	4.4
	Bachelor's Degree	19	21.1
	Master's Degree	63	70.0
	Doctoral Degree	4	4.4
Experience in Years	1-4 years	26	28.9
	5-8 years	27	30.0
	8 or above	37	41.1

Table 3: RBIA descriptive statistics

	1	2	3	4	5
RBIA implementation allows for a better understanding of internal audit processes.	1 1.1%	1 1.1%	1 1.1%	56 62.2%	31 34.4%
RBIA implementation allows for periodic assessment of internal audit processes.	0 0.0%	1 1.1%	8 8.9%	51 56.7%	30 33.3%
RBIA implementation allows internal audit function to meet stakeholder expectations.	0 0.0%	0 0.0%	11 12.2%	46 51.1%	33 36.7%
RBIA implementation facilitates a more efficient allocation of internal audit resources.	0 0.0%	1 1.1%	14 15.6%	37 41.1%	38 42.2%

The numbers 1 to 5 in the heading row represent points on a 5-point Likert scale where 1= "Very Little Extent", 2= "Little Extent", 3= "Some Extent", 4= "Great Extent", and 5= "Very Great Extent".

Table 4: Descriptive statistics on the internal auditor role in risk management

	1	2	3	4	5
Internal Auditors understand strategic objectives and critical operational objectives.	0 0.0%	2 2.2%	14 15.6%	50 55.6%	24 26.7%
Internal Auditors take into account risk assessment findings upon creating annual internal audit plans.	0 0.0%	0 0.0%	6 6.7%	53 58.9%	31 34.4%
Internal Auditors assess inherent risks threatening the objectives of critical business functions and adjust their audits accordingly.	0 0.0%	0 0.0%	10 11.0%	54 60.0%	26 28.9%
Internal Auditors provide timely information to senior management regarding risks that threaten the viability of the organization.	0 0.0%	1 1.1%	13 14.4%	52 57.8%	24 26.7%
Internal Auditors monitor, assess, and report on the adequacy and effectiveness of the risk management system.	0 0.0%	3 3.3%	14 15.6%	54 60.0%	19 21.1%
Internal Auditors monitor, assess and report on the adequacy and effectiveness of the internal audit system.	0 0.0%	1 1.1%	14 15.6%	43 47.8%	32 35.6%

The numbers 1 to 5 in the heading row represent points on a 5-point Likert scale where 1= “Very Little Extent”, 2= “Little Extent”, 3= “Some Extent”, 4= “Great Extent”, and 5= “Very Great Extent”.

Table 5: Descriptive statistics regarding risk management training

	1	2	3	4	5
Risk management training contributes to the creation of an audit universe based on risk management.	0 0.0%	1 1.1%	5 5.6%	37 41.1%	47 52.2%
Risk management training contributes to the formation of correct perceptions regarding the detection and assessment of business risks.	0 0.0%	0 0.0%	5 5.6%	44 48.9%	41 45.6%
Risk management trainingincreasesthe quality of internal audit and risk management processes.	0 0.0%	0 0.0%	4 4.4%	36 40.0%	50 55.6%

The numbers 1 to 5 in the heading row represent points on a 5-point Likert scale where 1= “Very Little Extent”, 2= “Little Extent”, 3= “Some Extent”, 4= “Great Extent”, and 5= “Very Great Extent”.

Table 6: Descriptive statistics regarding active audit committee role

	1	2	3	4	5
The Audit Committee reviews, approves and assesses audit plans.	0 0.0%	0 0.0%	10 11.1%	50 55.6%	30 33.3%
The Audit Committee periodically monitors IA activities to ensure they cover all areas of the organization.	0 0.0%	0 0.0%	13 14.4%	44 48.9%	33 36.7%
The Audit Committee takes into account information regarding operational risks and control mechanisms in performing its duties.	0 0.0%	0 0.0%	12 13.3%	53 58.9%	25 27.8%
The Audit Committee actively supports IA focus on critical operational risks and adequate risk management system processes.	0 0.0%	2 2.2%	13 14.4%	52 57.8%	23 25.6%

The numbers 1 to 5 in the heading row represent points on a 5-point Likert scale where 1= “Very Little Extent”, 2= “Little Extent”, 3= “Some Extent”, 4= “Great Extent”, and 5= “Very Great Extent”.

Table 7: Descriptive statistics regarding the establishment of formalized enterprise risk management (ERM)

	1	**2**	**3**	**4**	**5**
Enterprise risk management processes and responsibilities are clearly defined within the organization.	1 1.1%	7 7.8%	30 33.3%	36 40.0%	16 17.8%
There is a risk manager or a separate risk management section within the organization.	5 5.6%	11 12.2%	24 26.7%	22 24.4%	28 31.1%
A standardized risk management system is in place within the organization.	6 6.7%	8 8.9%	33 36.7%	24 26.7%	19 21.1%

The numbers 1 to 5 in the heading row represent points on a 5-point Likert scale where 1= "Very Little Extent", 2= "Little Extent", 3= "Some Extent", 4= "Great Extent", and 5= "Very Great Extent".

Table 8: Descriptive statistics regarding the establishment of formalized internal control system

	1	**2**	**3**	**4**	**5**
Effective control mechanisms have been formalized by management in order to identify and eliminate all business risks.	0 0.0%	10 11.1%	33 36.7%	37 41.1%	10 11.1%
A strong control awareness culture has been established in the organization.	2 2.2%	13 14.4%	34 37.8%	28 31.1%	13 14.4%
Internal Control System is monitored on an ongoing basis.	0 0.0%	15 16.7%	17 18.9%	39 43.3%	19 21.1%

The numbers 1 to 5 in the heading row represent points on a 5-point Likert scale where 1= "Very Little Extent", 2= "Little Extent", 3= "Some Extent", 4= "Great Extent", and 5= "Very Great Extent".

Table 9: Correlations

		1.	2.	3.	4.	5.	6.
1. Risk-based Internal Audit Implementation	Pearson Correlation	1	0.225*	0.364**	0.286**	0.237*	0.110
	(Sig.)		0.033	0.000	0.006	.024	0.300
2. Internal Auditor Role in Risk Management	Pearson Correlation	0.225*	1	0.236*	0.516**	0.231*	0.327**
	(Sig.)	0.033		0.025	0.000	0.029	0.002
3. Risk Management Training	Pearson Correlation	0.364**	0.236*	1	0.028	0.061	-0.037
	(Sig.)	0.000	0.025		0.794	0.566	0.727
4. Active Audit Committee Role	Pearson Correlation	0.286**	0.516**	0.028	1	0.284**	0.475**
	(Sig.)	0.006	0.000	0.794		0.007	0.000
5. Formalized Enterprise Risk Management (ERM)	Pearson Correlation	0.237*	0.231*	0.061	0.284**	1	0.680**
	(Sig.)	0.024	0.029	0.566	0.007		0.000
6. Formalized Internal Control System	Pearson Correlation	0.110	0.327**	-0.037	0.475**	0.680**	1
	(Sig.)	0.300	0.002	0.727	0.000	0.000	

*, **: Correlation significant at the 0.05 level (2-tailed) and the 0.01 level (2-tailed), respectively.

Table 10: Regression analysis results

	Coefficient	**t**	**p-value**	**Std. Error**
(Constant)	1.685	3.068	0.003	.549
Internal Auditor Role in Risk Management (H1)	-0.003	-0.030	0.976	.115
Risk Management Training (H2)	0.333**	3.358	0.001	.089
Active Audit Committee Role (**H3**)	0.298*	2.483	0.015	.116
Formalized Enterprise Risk Management (H4)	0.270*	2.070	0.042	.064
Formalized Internal Control System (H5)	-0.201	-1.409	0.163	.086
R adjusted squared	**0.203**			
F (ANOVA)	**5.525**		0.000	

Dependent Variable is Risk-based Internal Audit (RBIA) Implementation

*, **: Correlation significant at the 0.05 level (2-tailed) and the 0.01 level (2-tailed), respectively.