محددات تطبيق برامج إدارة الخطر في منشآت الأعمال: حالة جمهورية مصر العربية

رشا حنفي

مدرس المحاسبة – كلية التجارة، جامعة القاهرة

البريد الالكتروني: rasha.hanafi@foc.cu.edu.eg

تهدف هذه الورقة البحثية إلى دراسة مجموعة العوامل التي تدفع بمنشآت الأعمال إلى تطبيق برامج إدارة الخطر (ERM) Enterprise Risk Management في جمهورية مصر العربية. وقد تم الاعتماد على دراسة مجموعة الشركات الأكثر تداولا في سوق الأوراق المالية المصرية. و تم جمع بيانات من 86 شركة فقط تمهيدا للتحليل الإحصائي، واختبار الفروض البحثية. ولاختبار فروض البحث تم صياغة معادلة انحدار لوجستيكي Logistic Regression.

تشير النتائج الى أن العوامل التالية؛ حجم المنشأة، مستوى الربحية، نسبة السيولة ، مدى تنفيذ آليات أو سياسات حوكمة الشركات، بالاضافة الى نوع النشاط، يمكن أن توفر أساسًا مقبولًا لرغبة منشآت الأعمال في سوق الأوراق المالية المصرية في تنفيذ برامج إدارة المخاطر. و مع ذلك توضح النتائج أن درجة الرافعة المالية لها تأثير سلبي على قرارات الشركات في تنفيذ برامج ادارة المخاطر و أن النمو ليس له أي تأثير على تطبيق برامج إدارة المخاطر. و قد كشفت الدراسة ايضا ، على عكس نتائج الدراسات السابقة، وجود تأثير إيجابي للسيولة والربحية على قرار منشآت الأعمال بتنفيذ برامج إدارة المخاطر.

تكمن أصالة هذه الورقة البحثية فيما يلي. يضيف البحث الى الكتابات التجريبية حول محددات تطبيق نظم ادارة المخاطر ERM. بالاضافة الى ذلك تم فحص هذه العوامل في بيئة جديدة لم يتم تناولها في الادبيات السابقة، و هي بيئة الأعمال في جمهورية مصر العربية. علاوة على ذلك، و على عكس المؤلفات السابقة، تم قياس آليات الحوكمة Corporate Governance عن طريق قياس شامل و هو فيما اذا كانت الشركة مدرجة في مؤشر S&P/EGX ESG index من عدمه. و يتضمن هذا القياس مدى الوعي البيئي، و المسئولية الاجتماعية، و ممارسات أخرى في مجال حوكمة الشركات.

DETERMINANTS BEHIND ADOPTING ERM: A CASE OF EGYPT

Abstract

The main aim of this study is to investigate, and perform an empirical inquiry of, factors that impact a company's choice to adopt an Enterprise Risk Management (ERM) system in Egypt. The current paper focuses on a sample of 86 top corporations listed on the "Egyptian Stock Exchange". A logistic regression model is created to test the hypotheses.

Results suggest that size (Ln market capitalization), profitability (ROA), liquidity (current ratio), corporate governance (being listed on S&P/EGX ESG index) and belonging to some industry sector are possible positive drivers for ERM adoption. Nevertheless, leverage (debt to equity ratio) has a negative relationship to ERM engagement while growth (growth in book value of equity) has no effect on the implementation of ERM by the sampled companies. Contrary to prior literature, the current study revealed a positive impact of liquidity and profitability on the corporation's decision to apply an ERM system.

Originality of the current paper lies in the following. It adds to the empirical literature on drivers of ERM deployment. In addition, these reasons are examined in a new context; Egypt, which is not presented in the prior literature. Moreover, in contrast with prior literature, Corporate Governance is proxied by a comprehensive measure, namely, being listed on S&P/EGX ESG index, which covers environmental awareness, social responsibility, and other corporate governance practices.

1. Introduction

Over the course of the last three decades, the failure of some big companies along with the contemporary Global Financial Crisis hitting world economies and, recently, the spread of the pandemic Covid19 lead to that the complexity, volume, interactions and dependencies of risks facing most companies increased (Amato, 2021; Lechner and Gatzert, 2018). All of this

demonstrated extreme flaws in the risk management systems of companies worldwide and created general concern on how corporations should carry out risk management. Consequently, stricter regulations (Pagach and Warr, 2011) as well as more improved ways of risk detection and measurement, and information technologies were not an unexpected result (Lechner and Gatzert, 2018).

These internal and external elements that are always changing in the business environment – including also globalization and industry consolidation, were a message and a wakeup call for all, which generated corporate interest into how different business risks are identified, assessed and managed (Hernández-Madrigal et al., 2020; Hoyt and Liebenberg, 2015; Paape and Speklé, 2012; Arena et al., 2010). Business organisations face a wide variety of risks including strategic business market risk, financial risk, hazard risk and operational risk (Abu Afifa and Saleh, 2021; Khodair, 2015). Financial or accounting-related risks further include liquidity risk, credit risk, foreign currency risk, interest risk, and compliance and financial reporting risks which are all in crucial need to be managed effectively for the success of the organisation (Ojeka et al., 2019; Francis and Paladino, 2008). Thus, an all-inclusive company-wide risk management framework, namely, ERM, became more needed and demanded, and it has lately become more important for controlling corporate risk (Gatzert and Martin, 2015).

To offer an overview of the essential aspects of ERM, a number of conceptual frameworks have been created and released. For example, the "Committee of Sponsoring Organizations of the Treadway Commission (COSO)" initially introduced their well-known ERM formal implementation methodology in 2004, proposing a comprehensive definition of ERM as follows:

> "a process, effected by an entity's board of directors, management and other personnel, applied in strategy setting and across the enterprise, designed to identify potential events that may affect the entity, and manage risk to be within its risk appetite, to provide reasonable assurance regarding the achievement of entity objectives"

(COSO, 2004: 2)[1]

The dissimilarities between ERM and Traditional Risk Management (TRM) lies in that ERM is proactive rather than reactive and defensive. TRM lacks coordination and communication amongst the various departments of an enterprise, with risk handling based on a department by department perspective. Here, risks are measured in isolation and concentration is on protecting the firm against adverse financial scenarios in an attempt to just minimize risk. This deems TRM an inefficient and deficient risk management program (Abdul Khalik and Sum, 2020; Gatzert and Martin, 2015).

Conversely, ERM is a structured risk management process as referred to by Meulbroek (2002). It takes into account the firm's overall risk portfolio in a holistic, integrated, aggregated, robust, and dynamic way across the entire firm as risk in one part of the enterprise affects other parts of the enterprise (Johnston and Soileau, 2020). ERM is a component of, and is integrated into, the whole company strategy and decision-making process. This, in turn, results in a more accurate evaluation of the company's risk status and enhances making decisions concerning strategic and operative developments. It may also contribute to the firm's worth protection and enhancement, achieving a comprehensive corporate perspective, and accounting for potential opportunities (Abdul Khalik and Sum, 2020; Gatzert and Martin, 2015; Nocco and Stulz, 2006; Meulbroek, 2002). Therefore, ERM is deemed to be more effective than the traditional approach in handling and managing relevant critical risks that might interfere with achieving the objectives of the company. It is also considered a fundamental and key element of any modern business, which helps companies maintain their competitive advantage (Abdul Khalik and Sum, 2020). Moreover, rating agencies started considering ERM. For example, Standard and Poor's (S&P's) includes ERM in its credit risk ratings done for corporations since 2008 (Khodair, 2015).

---

[1] KPMG issued the "KPMG Enterprise Risk Management" guideline in 2001 (see KPMG, 2001). In 2002, the "Federation of European Risk Management Associations" (FERMA) established an ERM framework (FERMA, 2002). Furthermore, in 2009, the "International Organization for Standardization" established and recommended the "ISO 31000 Risk Management Principles" (see ISO, 2009). Moody's has also had a Risk Analysis Initiative in place since 2003, where "Risk Management Assessment" is one of its key elements. They intend to include ERM analyses into it as well.

From its definition, ERM is applied across the entire enterprise with participation from all departments including the accounting department. Lundqvist (2014) emphasises that ERM is a "top-down process" where CEO, CFO and the senior executive team have an important role to play in ERM enactment. Accountants, in different aspects of accounting, are found to be increasingly involved in ERM implementation (Chaplin, 2019). The Institute of Internal Auditors (IIA), for instance, revealed the involvement of internal auditors in a study in 2005 (Beasley et al., 2005a). Further evidence of internal auditors' involvement in ERM responsibilities is provided by Fraser and Henry (2007), Francis and Paladino (2008) and de Zwaan et al. (2011). Internal auditors within an organisation play a crucial role in management of risks by providing assurance and consulting services (de Zwaan et al., 2011).

In the same vein, Chaplin (2019), Ojeka et al. (2019) as well as Walker and Frigo (2017), argue that the role of the Chief Financial Officer (CFO) in managing enterprise risk is continuously expanding in this disruptive and rapidly changing environment. Accountant's involvement with ERM implementation is deemed important since ERM group responsibilities include, as stated by Francis and Paladino (2008), assisting the organisation in complying with relevant accounting standards and in dealing with several accounting issues such as price forecasts, setting financial objectives, cost-benefit analysis, and budgeting and capital allocation. Moreover, Lundqvist (2014), exploring the pillars of ERM, reveals the consideration of financial components and the inclusion of accountability dimensions within an ERM system.

Likewise, Management Accounting Systems (MASs), as argued by Abu Afifa and Saleh (2021), complement ERM by playing significant role in setting goals, analyse costs and quantify benefits of risk management procedures, estimate probable consequences from risk occurrences, and compare actual performance of the risks that firms confront. Moreover, the information produced by MASs is utilized in performance management and control leading to improvement in ERM implementation and, in turn, minimising risks, enhancing operating efficiency, and accelerating decision-making process (Abu Afifa and Saleh, 2021). MASs are, thus, an essential component of strategic planning and performance evaluation.

Management accountants can also take a role in setting and understanding risk tolerances and appetites of the organisation (Khodair, 2015). Accountants, not only provide reliable information but also, allow making sound decisions which, in turn, means less risk (ACCA, 2012).

Therefore, as accountants adopt the norms of risk management, they provide support to decision-makers that help them understand and manage risk. Accountants are, thus, put by ERM in a very important position in facilitating and contributing to an integrated risk management system; a "built-in" system. Furthermore, not only does accountants contribute to ERM but further as Shannon (2017), featured in a video by Financial Management magazine, states that accountants in different positions within an organization are often leaders in the development and superintending the ERM system, in identifying the potential risks, and in setting controls to mitigate those risks rather than having to come up with a response plan in the middle of a crisis.

Given the above contribution of accountants to various ERM responsibilities, several studies contend that the accounting team is important, rather core, in the process and recommend accountants' active involvement in and leading of ERM implementation owing to their relevant expertise and knowledge of data governance and control of financial data (e.g., Ojeka et al., 2019; Chaplin, 2019; Shannon, 2017; IIA, 2009).

Not only is ERM affected by accountants but it also has its influence on accounting. Many studies revealed that ERM is important and relevant to accounting in terms of improving firm value and operating performance (e.g., Hoyt and Liebenberg, 2011; Beasley et al., 2008; Nocco and Stulz, 2006). Wang et al. (2018) also state that as an integrated framework for recognising and mitigating dependent risks, ERM can decrease earnings fluctuations. It is also regarded as a tool to increase financial statements reliability as it mitigates earnings management and, thus, enhances quality reporting of the firms' financial position and earnings to investors and creditors (Johnston and Soileau, 2020). Liebenberg and Hoyt (2003) affirm that ERM improves directors' decision making which leads to decreased costs, positive cash flows, and more accurate estimation of accruals (Johnston and Soileau, 2020). Owing to the above mentioned possible benefits of adopting ERM, companies approach towards embracing this

holistic system evolved (Lechner and Gatzert, 2018; Gatzert and Martin, 2015; Baxter et al., 2013). This new focus; ERM, has become increasingly demanded and was implemented by a growing number of enterprises (Abdul Khalik and Sum, 2020; Hoyt and Liebenberg, 2015; Arena et al., 2010).

In tandem, in recent years, ERM has enticed the attention and interest of academics and empirical researchers alike (Abdul Khalik and Sum, 2020; Mikes and Kaplan, 2015). According to Lechner and Gatzert (2018), ERM prior literature can generally be categorised into three primary research areas, i.e. ERM frameworks and the extent of their implementations, drivers of ERM application, and the influence of ERM adoption on corporate performance and shareholders' value.

Earlier ERM studies mostly focused on the stage/extent of adoption and cost considerations. These two fields of study were main concerns when ERM was implemented for the first time on an experimental basis (Khan et al., 2016; Desender, 2011). Numerous writers, for example, used surveys, interviews, and questionnaires to describe the *stage of ERM adoption* (for example, Yazid et al., 2011; Daud et al., 2011, 2010; Beasley et al., 2009). A second line of inquiry into the literature takes it further and focuses on trying to quantitatively investigate the significant *determinants* behind corporate adoption of an ERM framework (see, e.g., Farrell and Gallagher, 2015; Golshan and Abdul Rasid, 2012; Razali et al., 2011; Hoyt et al., 2008). This line of research attempted to learn about the features of businesses that have already implemented ERM in order to establish a link between company characteristics and implementation decision. Nevertheless, corporate reasons to apply ERM are complicated, as demonstrated by prior studies[2] (Gatzert and Martin, 2015; Lundqvist, 2015; Gates, 2006). Third, some additional research has sought to quantitatively investigate the influence of ERM adoption on *corporate performance and value* as an outcome of ERM adoption (e.g., Malik et al., 2020; Farrell and Gallagher, 2015; Khodair, 2015; Eckles et al., 2014; Baxter et al., 2013; Paape and Speklè, 2012; Hoyt and Liebenberg, 2011; Gordon et al., 2009; Hoyt et al., 2008)[3].

---

[2] Next section; Literature Review, will cover a brief discussion on main determinants.

[3] Many studies conclude that ERM improves corporate performance and optimises shareholder values.

Despite the fact that there is ample research on ERM implementation, studies on developed countries tend to dominate, such as: the USA (Hoyt and Liebenberg, 2011; Beasley et al., 2005b) which, in terms of empirical evidence, is the most productive (Anton and Nucu, 2020); Canada (Aabo et al., 2005; Kleffner et al., 2003); Australia (Ahmad et al., 2014; Subramaniam et al., 2009); the UK (Collier et al., 2006); Italy (Florio and Leoni, 2017; Arena et al., 2010), France (Khan et al., 2016); Germany (Lechner and Gatzert, 2018); the Netherlands (Paape and Speklé, 2012); the Nordic countries (Lundqvist, 2015) and Spain (Hernández-Madrigal et al., 2020).

Contrariwise, ERM research in developing countries is scarce (e.g., Faisal and Hasan, 2020; Suttipun et al., 2018; Eid, 2010). In addition, these studies mostly concentrate on one strand; the effect of ERM on firm performance. Therefore, a need arises for empirical evidence on drivers of ERM execution with an application on developing countries which is insufficiently addressed, yet very important (Suttipun et al., 2018). Moreover, there is little empirical indication of ERM systems developed by middle-eastern countries and, in specific, the knowledge of the ERM practices carried out by Egyptian companies. There are currently no published research papers analysing motivations behind Egyptian firms' ERM procedures, to the best of one's knowledge. Hence, this paper is an initial endeavour to study determinants of ERM in Egypt. It is the first empirical study of this type for Egypt and among the first for a Middle-Eastern Arab country.

Thus, owing to the above and the complexity of the issue as well as to the benefit of ERM to accounting and its relation to accountants, and in response to the call by Anton and Nucu (2020) for more research on ERM implementation determinants and on ERM investigations in new contexts, the current paper; aiming to fill this gap, is especially interested in the Egyptian market. By studying top listed companies on the Egyptian Stock Exchange, an attempt is made to empirically investigate and identify different firm specific characteristics that may influence and contribute to firms' decision towards adoption of ERM practices by Egyptian companies.

This paper hypothesize that several corporate characteristics and accounting-related indicators affect the implementation of ERM. Hence, a number of possible drivers of ERM adoption were chosen and their impact was empirically examined. These chosen explanatory factors are firm size, industry, liquidity, leverage, growth, profitability and corporate governance.

Empirical evidence suggests that the following factors are possible drivers for, and positively impact, ERM implementation in Egyptian listed companies: size, profitability, liquidity and corporate governance. Moreover, results reveal that companies from the following industries; Banks, Personal and household products, Financial services excluding banks, and Chemicals, are more inclined to embrace ERM. However, ERM engagement is found to have a negative relationship with leverage. Unexpectedly, growth and the rest of the heavy industries seem to have no effect on ERM application by the companies in the sample.

This article contributes to ERM research in a number of ways. Primarily, the current paper adds to the current corpus of knowledge on determinants of ERM implementation. It also extends empirical evidence to provide data from a setting; i.e. Egypt, different from the majority of countries that have been previously studied and analysed. Furthermore, counter to prior literature, a comprehensive measure, namely, being listed on S&P/EGX ESG index, is used to represent Corporate Governance. This measure covers environmental awareness, social responsibility, and other corporate governance practices relating to the characteristics of the BOD or the audit committee.

This variety of empirical evidence could help to an improved comprehension of the elements that impact ERM adoption in diverse institutional settings (Paape and Speklé, 2012) and could help as a basis for future investigations into similar contexts. Moreover, understanding ERM determinants paves the way for more informative regulatory ERM frameworks to emerge. In addition, given the lead involvement of accountants with ERM implementation, understanding determinants of ERM will help them to enhance their contribution to ERM.

The remaining of the article is structured in four sections. Section two below presents a review of related literature including hypotheses development pursued by a description of the study plan in section three. The findings are presented and discussed in the fourth section. Finally, the conclusions of the study are summarized with implications, limitations and future research prospects.

2. Prior Literature Review

As referred to in the above section (Introduction section), ample research on ERM was conducted in US contexts and to a lesser extent in European countries. Scare empirical evidence on ERM in developing countries is witnessed. Moreover, most of all previous literature in the developing world show that ERM can generate value. Hence, the question arises as to what factors influence the likelihood of a firm's implementation. Additionally, there is no evidence of any research done in Middle Eastern or Arab, specifically Egyptian, context regarding determinants of ERM.

A number of research articles that investigated the elements that impact ERM system implementation find company-specific elements, such as financial, structural, and ownership characteristics, to be predictors of ERM implementation. Several research on the adoption and drivers of an ERM program include a strong qualitative component (e.g., Daud et al., 2011; 2010; Beasley et al., 2009). However, other studies attempted to elicit evidence that is significant statistically concerning the drivers of ERM. The most widely examined hypotheses are described in the following paragraphs and the generally assumed relation in prior literature is portrayed. In addition, a summary of the results of previous empirical studies is provided. The hypotheses for the current study are also formed.

Company size is, in particular, identified in the vast bulk of past research as a significant determinant that positively affect ERM implementation (e.g., Brustbauer, 2016; Farrell and Gallagher, 2015; Lundqvist, 2015; Eckles et al., 2014; Baxter et al., 2013; Paape and Speklé, 2012; Desender, 2011; Beasley et al., 2005b; except for Hernández-Madrigal et al., 2020; and Liebenberg and Hoyt, 2003). For example, in Pagach and Warr (2011) and Hoyt et al. (2008), the company size is even significant at the 1% level.

Previous literature provides several arguments that answer the question as to why ERM systems are more likely to be used and implemented by larger companies. Firstly, it has been claimed that as firms get larger and increase their scope of business, they become more complex. This, in turn, is associated with an increased exposure to a wider range of more complex risks. Thus, there is a larger demand for more complex and efficient risk management approaches, which tends to increase the chance that ERM will be implemented (Faisal and Hassan, 2020; Gatzert and Martin, 2015; Desender, 2011; Hoyt and Liebenberg, 2011; Beasley et al., 2005b; Kleffner et al., 2003). Secondly, larger firms also tend to have more financial, technological, technical and human resources to allocate, which typically entails having greater ability to invest in and apply ERM programs (Johnston and Soileau, 2020; Lechner and Gatzert, 2018; Golshan and Abdul Rasid, 2012; Yazid et al., 2012; Desender, 2011; Beasley et al., 2005b). They, thus, are able to cover the administrative and operational expenditures associated with ERM implementation (Abdul Khalik and Sum, 2020) and can benefit from important economies of scale (Beasley et al., 2008). Lechner and Gatzert (2018) also argue that large companies have a broader view when it comes to risk detection and are able to operate an ERM program across many business divisions. Based on the arguments above, a positive association is anticipated between the size of the company and ERM adoption and is hypothesized as follows:

H1: The bigger the size of the company listed on the Egyptian Stock Exchange, the more likely it is to implement an ERM system.

As indicated by several prior studies, companies in specific *industries* are more inclined than others to implement an ERM programme (see, e.g., Abdul Khalik and Sum, 2020; Lechner and Gatzert, 2018; Beasley et al., 2005b; Kleffner et al., 2003). It is argued that companies operating in high risk industries with a higher and different degree of risk exposure and awareness (Abdul Khalik and Sum, 2020; Golshan and Abdul Rasid, 2012) as well as companies in other more strictly regulated industries (Brustbauer, 2016) are more prone to participate in an ERM process, compared to companies from other industry sectors. This is to ensure that a risk management system is adequate, transparent, systematic and effective in order to boost trust in capital markets and attract new customers (Lechner and Gatzert, 2018; Lundqvist, 2015; Baxter et al., 2013; Golshan

and Abdul Rasid, 2012; Paape and Speklé, 2012; Hoyt et al., 2008; Beasley et al., 2008). Financial firms, banks, insurance, education, and energy corporations are examples of regulated sectors[4] (Gatzert and Wesker, 2012; Beasley et al., 2005b), whereas utilities, telecommunications, and oil and gas companies are examples of high-risk industries (Abdul Khalik and Sum, 2020; Frantz, 2011).

These arguments imply that the adoption of ERM and the industry in which a company functions may be linked. In this regard, numerous prior studies have found that businesses in the financial industry are more prone to adopt ERM (Hernández-Madrigal et al., 2020; Lechner and Gatzert, 2018; Pagach and Warr, 2011; Beasley et al., 2005b; Liebenberg and Hoyt, 2003) as well as companies operating in the energy and oil industries (Hernández-Madrigal et al., 2020; Kleffner et al., 2003). However, significance of the relationship is inconclusive. For example, concentrating on the education, finance, and insurance sectors, Beasley et al. (2005b) demonstrate that these industries are far more advanced when it comes to the creation of ERM frameworks than other sectors. However, Golshan and Abdul Rasid (2012), applying a similar approach for regulated financial and energy sectors, was unable to find any evidence of a substantial link. In addition, Hoyt and Liebenberg (2011), applying on the insurance sector, find a positive but insignificant relation to ERM. As a result, a comparable link is anticipated within the scope of the current study's sample and it is assumed that:

H2: If the company listed on the Egyptian Stock Exchange is operating in the financial including banks, chemicals or pharmaceuticals industries, the more likely it is to implement an ERM system.

It is also argued that *liquidity* is a determinant of ERM adoption. On one hand, the insufficiency of the available liquidity increases the probability of financial distress in the indebted organizations (Smith and Stulz, 1985). Therefore, the organizations that do not have sufficient liquidity are those that will profit the most from ERM's integration. On the other hand, it has

---

[4] There are a number of regulatory systems that apply to the banking and insurance businesses, for example, Basel agreements (I/II/III) as well as Solvency II. The energy sector, likewise, has high standards for corporate governance and risk management that must be met (Lechner and Gatzert, 2018).

been suggested that the rise in financial slack (liquid assets) may help companies to afford the initial expenditure necessary to execute an ERM programme and organizations can use their liquid assets in case of insufficient cash-flows (Berry-Stölzle and Xu, 2018). Most previous researchers, however, find that liquidity does not exert any significant impact on ERM integration (Farrell and Gallagher, 2015; Hoyt and Liebenberg, 2011). Nevertheless, according to Pooser and McCullough (2012), organisations that have ERM systems are more prone to have lower levels of liquidity. According to the prior argumentations, it is assumed that:

H3: The higher the liquidity of the company listed on the Egyptian Stock Exchange, the more likely it is to implement an ERM system.

Besides corporate size, industry sector and liquidity, ERM implementation is also predicted to be influenced by *financial leverage* (Liebenberg and Hoyt, 2003). Nevertheless, financial leverage and ERM have an unclear, inconclusive and mixed relationship (Hoyt and Liebenberg, 2011). While some empirical studies find significant positive relationship (e.g., Berry-Stölzle and Xu, 2018; Golshan and Abdul Rasid, 2012; Pagach and Warr, 2011), others show a significant negative relationship (e.g., Lechner and Gatzert, 2018; Baxter et al., 2013; Hoyt and Liebenberg, 2011; Hoyt et al., 2008). Further studies show no influence of leverage on ERM implementation (e.g., Desender, 2011) while an association is detected by Razali et al. (2011) although it is not significant (see also, Farrell and Gallagher, 2015; Lin et al., 2012).

Argumentations in favour of financial leverage are twofold. On the one hand, the positive coefficient supports the idea that highly leveraged firms will have more efficient and effective risk management systems to decrease possible losses owing to a higher risk of financial hardship and related costs (Golshan and Abdul Rasid, 2012; Pagach and Warr, 2011; Aabo et al., 2005). Furthermore, ERM activities enable firms to use more equity in their financial structures, to improve communication on risks between organizations and their stakeholders which will, in turn, improve investments in these organizations and reduce debt costs (Liebenberg and Hoyt, 2003) by presenting the capital market an adequate corporate strategy, a trustworthy risk management and a suitable risk policy with a

better protection against the unforeseeable risks (Meulbroek, 2002). This may result in more favourable circumstances for debt financing, allowing for the financing of further debt. On the other hand, according to Hoyt and Liebenberg (2011), firms having lesser financial leverage, which is typically linked with fewer financial risks, may choose an ERM system in order to take further future financial risk. In addition, ERM implementations necessitate financial resources, and businesses with lower levels of debt find it simpler to launch such a programme. Hence, the following is hypothesized:

H4: The higher the financial leverage of a company listed on the Egyptian Stock Exchange, the more likely it is to implement an ERM system.

In terms of *growth*, companies with strong growth potential confront higher risks and a rising degree of uncertainty in terms of future cash flows, and are accordingly more inclined to establish an ERM program (Pagach and Warr, 2011; Liebenberg and Hoyt, 2003) in order to attract and maintain firm-specific investments (Khan et al., 2016). To elaborate on this point further, an ERM system not only helps to decrease risks, but also takes into consideration possible prospects, allowing growth potential to be achieved in an ideal manner through the use of an ERM system. The development prospects of high-potential firms, according to Beasley et al. (2005b), are typically underestimated, resulting in higher loan costs. As a result, the benefits of ERM are enhanced by increased growth prospects. Previous research, however, finds that growth opportunities have no substantial impact on ERM adoption (Gatzert and Martin, 2015; Waweru and Kisaka, 2013; Lin et al., 2012; Pagach and Warr, 2011; Liebenberg and Hoyt, 2003). In addition, throughout the empirical literature, the (insignificant) direction of the association is inconsistent. Khan et al. (2016), however, finds significant positive relationship. Hence, the hypothesis is as below:

H5: The higher the growth of a company listed on the Egyptian Stock Exchange, the more likely it is to implement an ERM system.

Another significant driver for ERM that has been studied in the literature is the company *profitability* measured by "return on assets" (ROA). ROA measures how profitable a firm is compared to the value of its total assets. It demonstrates how successfully management is utilising the firm's entire

assets to generate a profit. ROA is considered a measure of managerial efficiency when a company's available assets are used to create earnings. It is assumed that companies with greater ROA will be more inclined to fund and dedicate the necessary financial resources to the implementation of an ERM system (Lechner and Gatzert, 2018). However, Lechner and Gatzert (2018) find significant negative relationship between profitability and ERM implementation while Razali et al. (2011) discover that profitability is an insignificant driver of ERM practices. In the current study, it is assumed that:

H6: The higher the profitability of a company listed on the Egyptian Stock Exchange, the more likely it is to implement an ERM system.

Furthermore, according to Lundqvist (2015), *corporate governance* details are further drivers for ERM adoption. ERM and corporate governance, according to Quon et al. (2012), are interconnected and interrelated in nature since they both aid organisations identify, analyse, reduce, and manage risks in an organised manner (Zahiruddin and Abdul Manab, 2013). Different measures and proxies of corporate governance are employed by the literature to study whether it is a significant determinant of ERM implementation or not. These include: number of the board of directors (BOD) members, BOD independence, BOD expertise, audit committee characteristics, independence of the audit committee, audit committee members' financial education, risk committee characteristics, number of members of the risk committee and risk committee independence. Prior research results reveal that some aspects of corporate governance are significant factors influencing ERM implementation (e.g., Abdul Manab et al., 2010; Gates, 2006). The BOD characteristics are found to be a crucial element impacting ERM adoption with the BOD reinforcement being one of the driving forces (Kleffner et al., 2003). According to Abdul Manab and Kassim (2012), support and leadership from the Board of Directors (BOD) are essential factors in the adoption of ERM. According to Abdul Khalik and Sum (2020), the size of the board has considerable effect on ERM adoption (see also, Maruhun et al., 2018). The risk committee's independence has also been shown to improve ERM implementation (Gatzert and Martin, 2015; Walker, 2009). Additionally, higher BOD independence support and encourage ERM implementation (Mohd-Sanusi et al., 2017; Khan et al., 2016; Desender, 2011; Daud et al.,

2009; Beasley et al., 2005b). Maruhun et al. (2018) find that board expertise has significant associations with ERM implementation. In the current study, being listed on the "S&P/EGX ESG index" is the proxy for corporate governance[5]. Hence, it is hypothesized as follows:

H7: If a company listed on the Egyptian Stock Exchange has available corporate governance, the more likely it is to implement an ERM system.

Thus, in general, the ERM practice is deemed to be a complicated process. Hence, the current study investigates several determinants of ERM implementation with emphasis on listed Egyptian companies. In accordance with the already discussed empirical and theoretical literature on the drivers of ERM, this study hypothesises that larger, more liquid, highly leveraged, growing, profitable companies as well as companies listed on "S&P/EGX ESG index" are likely to apply ERM procedures. Furthermore, industry type is expected to have an effect on ERM implementation. Therefore, this paper establishes its hypotheses as above. The following section discusses the research design including sample selection and the measurements of variables.

3. Research Design

The goal of this study is to find out more about whether some corporate characteristics and accounting-related indicators drive ERM implementation in the Egyptian context. To achieve this, the study employs a quantitative method and relies on secondary data. This section outlines the research methodology used to fulfil this goal.

3.1) Sample

The research focuses on the top hundred Egyptian firms that are listed on the Egyptian Stock Exchange at the beginning of year 2019. These companies are the most actively traded in the Egyptian stock exchange. It is also reasonable to assume that firms in this sample are more inclined to apply ERM compared to other publicly traded companies. This might be

---

[5] Refer to footnote 8 for further information about the "S&P/EGX ESG index" and how this index is constructed.

the case due to the company's bigger size, increased trading activity, an improved culture of investor interactions, increased visibility, and more resources.

The names of the companies in the sample were acquired from the "Egyptian Company for Information Dissemination" (EGID) website (www.egidegypt.com) in February 2019. Nevertheless, the necessary data were collected from 96 companies only due to missing data for three companies and one company was subsequently delisted; in August 2019. **Table I** depicts the sample distribution by industry. According to **Table I**, it is possible to conclude that the following industries dominate the sample; the financial services, food and beverages, real estate, and construction and materials industries, while media, oil and gas, and retail industries are the least represented in the sample. However, industries with 3 companies or less are excluded from the final sample and, in turn, from any statistical analysis[6]. Thus, the final sample consists of 86 companies distributed among 10 industrial sectors. The sample period for the data is between March and June 2019.

Table I: Sample Distribution by Industry

Industry	Number Of Companies
Banks (BANKS)	8
Basic Resources (BR)	6
Chemicals (CHEM)	5
Construction and Materials (CM)	10
Financial Services Excluding Banks (FSEB)	14
Food and Beverage (FB)	13
Healthcare and Pharmaceuticals (HPH)	2
Industrial Goods and Services and Automobiles (IGSA)	9
Media (MD)	1
Oil and Gas (OG)	1
Personal and Household Products (PHP)	4
Real Estate (RS)	12

---

[6] Excluded industries are highlighted in Table 1.

Retail (RT)	1
Technology (TECH)	3
Telecommunications (TELE)	2
Travel and Leisure (TL)	5

3.2)   Measuring ERM and Corporate Characteristics

In general, and as argued by Gatzert and Martin (2015), companies seldom disclose specifics about their current risk management system or strategies. As a result, the empirical research is challenged with the task of determining whether or not an ERM system has been established. As a consequence, ERM implementation has been measured in a variety of ways in prior research on ERM drivers (McShane et al., 2011). In the present study, following Lechner and Gatzert (2018), Khan et al. (2016), Golshan and Abdul Rasid (2012) and Pagach and Warr (2011), a detailed keyword search was conducted searching for any signal of ERM implementation such as employment of CRO, presence of a "risk committee", or a "risk management department". The fundamental rationale for this method is that, because ERM is an integrated and complicated process, companies that apply it must have a specific person (e.g., a CRO) or a group of people (e.g., risk committee or risk department) in charge of it (Beasley et al., 2008). For this reason, corporate websites and published corporate annual reports were scanned utilizing the following keywords, their alternative words and abbreviations: "enterprise risk management", "risk management program", "chief risk officer", "chief risk manager", "head of risk management", "ERM framework", "risk committee", "risk management department", "operation risk management", "risk sector" and "risk manager". A binary variable was assigned if the hit was successful (ERM = 1), otherwise a 0 was assigned. A total of 33 firms in the final sample were found to have an ERM programme[7].

The data for independent variables utilized in this paper were gathered from various sources. These include websites such as "Egyptian Stock Exchange" (EGX) website and its publications, Thomson Reuters database, the "Egyptian Company for Information Dissemination" (EGID), the

---

[7] Surveys (see, Beasley et al., 2005b), external databases such as "OSIRIS database" (Razali et al., 2011), "Standard & Poor's" ERM rating (McShane et al., 2011), or creation of ERM indexes (Abdul Khalik and Sum, 2000; Gordon et al., 2009) are all alternative options used in prior research for detecting ERM systems.

"Egyptian Institute of Directors: (EIoD)[8], Corporate Information website, Mubasher Egypt, in addition to each company's webpage. Companies were searched for using EGX's company code (Reuters Code) along with their names.

According to the study of the relevant literature and as referred to in Sections One (Introduction) and Two (Literature Review), it is found that no research has been conducted in Egypt that investigate ERM drivers. In view of that, this current study will look into the relationship between ERM and companies' characteristics/accounting performance indicators in Egyptian listed companies. The definitions/measurement schemes of the various variables are given in **Table II**. The hypotheses established in this paper are explained in Section Two (Literature Review) above and the relationships between the selected firm characteristics/performance and ERM will be subsequently explained.

3.3) Data Analysis and Regression Model

The arithmetic mean, standard deviation (SD), maximum (Max) and minimum (Min) are calculated using descriptive analysis. The logistic regression model shown below was created to test the hypotheses:

---

[8] "The Environment, Social and Governance" (ESG) Index for Egyptian listed companies was constructed by the "Egyptian Institute of Directors (EIoD)", "Egyptian Corporate Responsibility Centre (ECRC)" and "Standard & Poor's (S&P)". To develop this index, S&P and the EGX use nine criteria namely: "ownership structure and shareholder rights, financial and operational information, board and management structure and process, corporate governance and corruption, business ethics and corporate responsibility, environment, employees, community, and customers/product". For each of the sampled companies, two scores must be calculated in order to arrive at the overall score: (i) "Quantitative" Score – each of the EGX companies is given a numerical ranking which is based on three elements: transparency and publication of (1) corporate governance, (2) environmental responsibility procedures, and (3) social responsibility procedures, and (ii) "Qualitative" Score – independent sources of information (i.e. news stories, webpages, and "CSR filings") are utilised to assess the true performance of EGX companies on a scale from 5 to 1. Finally, each company's overall score is produced by adding the qualitative and quantitative scores. The first 30 firms in the "S&P/EGX ESG index" were chosen after these scores were ranked across all EGX listed companies. The EGX created the "S&P/EGX ESG index" in March 2010 with the goal of improving the openness and disclosure policies of listed firms in terms of corporate governance and CSR activities. In the Middle East, this index is the first of its type. This index is reviewed and updated annually. In the current study, being included in this index represents a measurement of the presence of corporate governance (CG).

$Logit\ (ERM_i) = \beta_0 + \beta_1\ LNSIZE_i + \beta_2\ INDUSTRY_i + \beta_3\ LIQUIDITY_i + \beta_4\ LEVERAGE_i + \beta_5\ BVG_i + \beta_6\ ROA_i + \beta_7\ CG_i$

This model is formed under a cross sectional regression. However, it has to pass the classical assumptions, such as normality and multicollinearity. The gathered data are subsequently analysed and summarized. The following section presents and discusses the outcomes of the analysis.

4. Results and Discussion

4.1) Descriptive Characteristics

The descriptive statistics for the independent variables in **Table III** shows that the Firm Size, represented by market capitalization, ranges from 52.65 million to 122.24 billion and has a mean of 6.6 billion. Market capitalization normality distributions were skewed. As a result, in the regression analysis, the natural logarithm was employed to decrease skewness and bring the variable distribution closer to normalcy. All other variables were tested for normality using Jarque-Bera test and were all found to be normally distributed. The data was further tested for multicollinearity using the variance inflation factor (VIF), and no concerns with collinearity were discovered.

Table II: Description of Dependent and Independent Variables

Variable	Abbreviation	Description
Dependent Variable		
Enterprise Risk Management	ERM	Implementation of ERM proxied as explained above
Independent Variables:		
Profitability	ROA	Annual Return on Assets (Net Income/Average total Assets)
Size	LNSIZE	Natural Logarithm of Market Capitalization
Industry Type	BANKS, BR,	The EGX sector indices

	CHEM, CM, FSEB, FB, IGSA, PHP, RS, TL.	classification
Leverage	LEVERAGE	The annual ratio of total liabilities to total owners' equity
Liquidity	LIQUIDITY	Annual Current Ratio
Equity Growth	BVG	Log of 1 plus Firm's growth in book value of equity per share (5Y)
Corporate Governance	CG	A dummy variable taking the value of 1 if the company is a constituent in the S&P/EGX ESG index, 0 otherwise

Liquidity measure ranges from 0.32 to 22.44, with a mean of 1.94. Furthermore, average Leverage for the companies was around 91.63 percent, with a minimum of -536.4 percent, indicating a negative net worth or interest rates on loans larger than the return on investment, and a maximum of 2862.4 percent, indicating extremely high indebtedness. The high standard deviation of Leverage implies that the sample companies have varying levels of solvency. Book Value Growth ranges from -37.55 to 192.45 with a mean of 14.28. **Table III** also shows that ROA ranges from -105.21 to 44.26, with a mean of 4.46. The standard deviation for ROA implies that sample companies vary in terms of their return on assets. It is also discovered that most companies having an ERM system belong to the following sectors: Banks (8 banks) and financial services excluding banks (9 firms). They also tend to be larger in size.

Table III: Descriptive Statistics for Independent Variables

Variable	Maximum	Minimum	Mean	Standard Deviation
SIZE	122,240,300,000	52,650,000	6,556,694,155	14,482,208,763
LNSIZE	25.52925	17.77918	21.27548	1.761143
LIQUIDITY	22.44	0.32	1.94	2.81

LEVERAGE	2862.4	-536.4	91.63	315.23
BVG	192.45	-37.55	14.28	27.55
ROA	44.26	-105.21	4.46	16.16
Note: 27 sampled companies are included in the S&P/EGX ESG index (CG)				

4.2) Analyses Results

In this research, following Lechner and Gatzert (2018) and Liebenberg and Hoyt (2003), a logistic regression model (see Section 3.3) is used to estimate the impact of the above-defined firm characteristics on the likelihood of ERM implementation because the dependent variable; ERM, is dichotomous, i.e., has the values of either 1 if a company embraced enterprise-wide risk management or 0 if a company did not. The following relationship is analysed for an ERM application as a function of firm characteristics of firm i:

ERM_i = f (Size, Industry, Liquidity, Leverage, Growth, Profitability, Corporate Governance)$_i$

As described above, first a multivariate analysis is conducted by employing a binomial logistic regression to assess the conjoint influence of all independent variables on companies' decisions to adopt ERM programmes or not. **Table IV** displays the results based on the sampled companies with data for the year 2019. The first column lists the studied determinants (Independent Variables), and the estimated parameter (Estimated Coefficient) of the studied determinant using the regression model is provided in the second column. The Wald test findings, chi-square value, p-value, and probability of the multiplicative change in the odds ratio exp(B); Probability (Prob.) are displayed in the remaining columns.

Four goodness-of-fit tests were used to assess model fit and estimate the logit model's goodness-of-fit (predictive power). *Firstly*, as the value of "chi square test" is 42.617 at the 0.001 significance level, so therefore it can be established that the total independent variables have a statistically significant influence on the dependent variable, or the model is fitted to logistic regression, i.e. the model fits the data well. *Secondly*, the Hosmer-Lemeshow goodness-of-fit test (Hosmer-Lemeshow CHI^2 = 3.756; p = 0.878>0.05) designates that the logit model is generally adequate. The model adequately fits the data. *Thirdly*, the Nagelkerke R^2 is calculated at

0.495. This "coefficient of determination" value indicates that the independent variables allowed in the model account for 49.5 % (almost half) of the total variance of the log odds ratio or logit model, i.e., the dependent variable; ERM. The remaining percentage is attributable to the regression model's random error or additional independent variables that were not included in the regression model. This R^2 value is higher than that of similar studies (see Beasley et al., 2005b (R^2=28%); Razali et al., 2011 (R^2=18.5%)). *Finally*, as a further measure of the fit of the model and its overall accuracy, statistical analysis (classification table) also reveals that the current logistic regression model has an overall correct classification ratio of 80.2%. The percentage correct 1 for existence of ERM is 60.6%, the percentage correct 0 for nonexistence of ERM is 90.5%, and overall percentage correct scores is 80.2%. This means that the model is estimated to give an accurate prediction 80% of the time, i.e., the model is correctly classifying the outcome for 80% of the cases. From all the above tests, the binomial regression model can be concluded to be valid.

Table (IV): Logistic Regression Model to Determine the Impact of Corporate Characteristics on the Implementation of Enterprise Risk Management

No	Independent Variables	Estimated Coefficient	Wald test		Chi –square test		R^2	Prob.
			Value	Sig.	Value	Sig.		
1	Constant	-10.998	6.130	0.028*	42.617	0.001***	49.5%	.000
2	CHEM	2.46	11.94	.014*				0.92
3	PHP	1.16	9.05	.019*				0.76
4	BANKS	2.27	6.44	.026*				0.91
5	FSEB	1.91	3.29	.031*				0.88
6	FB	.20	.81	.872				0.55
7	IGSA	.97	.61	.435				0.73
8	CM	-.29	.04	.839				0.43
9	RS	.18	.03	.871				0.55
10	TL	1.04	.52	.469				0.74
11	BR	.14	.09	.992				0.53
12	LNSIZE	.43	4.23	.040*				0.61
13	LIQUIDITY	.5	7.55	.022*				0.62
14	LEVERAGE	-.96	6.10	.028*				0.28
15	BVG	-.17	3.13	.054				0.46
16	ROA	.69	16.52	.010**				0.67
17	CG	.62	7.22	.023*				0.65
CHI^2 Hosmer and Lemeshow Test =3.756 (SIG>0.05) correct classification ratio = 80.2								

*   **Parameter is significant at the (.05) level**   ** **Parameter is significant at the (.01) level**
***Parameter is significant at the (.001) level**

In spite of this, it is essential to compute each of the model's estimated coefficients individually. Moreover, if the significance values of certain predictor variables are less than 0.05 in relation to the dependent variable, it is safe to assume that they are all connected to the dependent binomial variable. Using Wald test, in the logistic regression model, the significant value of each of the independent variable coefficients is determined. The variable is relevant to the model if the Wald statistic is significant (i.e., smaller than 0.05). As observed in **Table IV** above, the independent variables CHEM, PHP, BANKS, FSEB show a high regression (2.46, 1.16, 2.27, 1.91) and a significant coefficient (0.014, 0.019, 0.026, 0.031, respectively) while LNSIZE, CG, LIQUIDITY, LEVERAGE and ROA show lower but also significant regression. The significant independent variables: CHEM, PHP, BANKS, FSEB, LNSIZE, CG, LIQUIDITY, and LEVERAGE have significance level less than 0.05, while ROA has less than 0.01 significance level. Despite that some of the remaining variables show some regression but the coefficient is nonsignificant. Hence, these variables do not have a significant impact on the adoption of ERM.

Each independent variable's probability event (Prob. is the odds ratio divided by Odds ratio plus one) indicates that the most significant and impactful variables are CHEM, BANKS, FSEB, PHP, TL, and IGSA with probabilities (0.92), (0.91), (0.88), (0.76), (0.74), and (0.73) respectively.

ERM implementation, the dependent variable, can be anticipated by substituting the values of independent variables.

Logit (ERM) =
 -10.998+2.46CHEM+1.16PHP+2.27BANKS+1.91FSEB+0.20FB+
0.97IGSA−0.29CM+0.18RS+1.04TL+0.14BR+0.43LNSIZE+
0.5LIQUIDITY−0.96LEVERAGE− 0.17BVG + 0.69ROA+0.62CG

4.3) Discussion

From the above analysis, it can be seen that most of the current paper's findings are in line with prior research. In agreement with Lechner and

Gatzert (2018), Farrell and Gallagher (2015), and Pagach and Warr (2011), the positive association between company size (H1) and the deployment of an ERM structure is shown to be statistically significant, implying that larger businesses are more prone to apply an ERM programme. The rising of risk quantity and complexity may encourage larger businesses to spend the required financial as well as human resources to adopt a comprehensive ERM program. Industry wise, the following industries are found to be more likely to adopt ERM: Banks, Chemicals, "Personal and Household Products" and Financial Services excluding banks. This result confirms previous evidence (e.g., Hernández-Madrigal et al., 2020; Beasley et al., 2005b; Paape and Speklé, 2012) which reveals that financial corporations are more open regarding the adoption of ERM systems. Hence, the results confirm that belonging to certain industries has an impact on ERM implementation (H2), which may be explained by tighter regulations, past crisis occurrences (for example, the financial crisis or the scandal of Enron), and possibly more risk awareness in general. However, in contradiction with findings from previous research (e.g., Hernandez-Madrigal et al., 2020), companies belonging to the following industries: basic resources; construction and materials as well as industrial goods and services and automobiles, are unlikely to adopt ERM.

Furthermore, a statistically significant positive connection between liquidity (H3) and ERM is observed. More liquidity brings about beginning expenditures required to adopt an ERM system and acts as a shield in case of insufficient cash-flows. This is, however, contrary to prior research that either finds a negative relationship (e.g., Pooser and McCullough, 2012) or doesn't find any significant influence of liquidity on ERM integration (e.g., Farrell and Gallagher, 2015; Pagach and Warr, 2011). Concerning financial leverage, the logistic regression results support Lechner and Gatzert (2018), Hoyt and Liebenberg (2011), and Hoyt et al. (2008) by revealing a statistically significant negative relationship between financial leverage and ERM engagement; that is, less leveraged companies tend to engage in ERM. Thus, H4 is rejected. It is easier for corporations having lower levels of debt to initiate an ERM program which requires financial resources. In line with most prior literature (e.g., Gatzert and Martin, 2015; Waweru and Kisaka, 2013; Lin et al., 2012; Pagach and Warr, 2011; Liebenberg and Hoyt, 2003), the current research finds that growth do not have any

significant influence on ERM implementation. Therefore, H5 is also rejected.

Moreover, ROA (H6) and ERM have a statistically significant positive association, implying that profitable businesses are more inclined to adopt an ERM practice. This is, however, inconsistent with Lechner and Gatzert (2018) who found substantial negative relationship and Razali et al. (2011) who found insignificant relationship. However, profitable businesses have readily available resources required for ERM adoption. Finally, and consistent with all prior literature studying the association of corporate governance to ERM engagement, the current study supports previous findings. CG (H7) and ERM have a statistically significant positive association. That is, firms listed on "S&P/EGX ESG index" are more inclined to embrace an ERM system.

5. Conclusion

The current research is undertaken to empirically examine the drivers of a firm's choice to implement ERM programs by top Egyptian listed companies, which represents one of the first studies to use a cross-sectional dataset for a Middle Eastern Arab country and the first for Egypt. Thus, seven corporate characteristics and accounting-related indicators were identified (firm size, industry sector, liquidity, leverage, growth, profitability and corporate governance) that may be associated with Egyptian listed firms' choice to adopt ERM. Logistic regression is used to investigate the drivers of ERM.

From the results, it is concluded that firm size, industry membership, liquidity, leverage, profitability and corporate governance may offer a reasonable foundation for explaining ERM implementation by Egyptian listed companies. Also, as expected, the sample businesses' ERM adoption appears to be unaffected by growth. However, unlike prior research, this study revealed that liquidity and profitability had a positive impact on businesses' choice to apply ERM. These conclusions are inconsistent Paape and Speklé's (2012:559) finding that "the factors that are associated with ERM implementation are similar across different national contexts". As a

matter of fact, the Egyptian market and setting differ from those of the majority of previously studied nations.

ERM research is still in its early stages, and there is a paucity of comprehensive empirical evidence. This paper contributes to ERM research in different ways. Firstly, it adds to the currently available body of knowledge on determinants of ERM application. In addition, these drivers are examined by adding empirical evidence from a new context; Egypt, which is not presented in the prior literature. Moreover, in contrast to prior literature, Corporate Governance is proxied by a comprehensive measure, namely, being listed on S&P/EGX ESG index, which covers environmental awareness practices, social responsibility practices, and other BOD/audit committee-related corporate governance practices.

The current paper has a number of theoretical and practical implications. Theoretically, this study fills a gap in the relevant literature by adding to the existing body of knowledge on ERM and its determinants in a new business context; Egypt. This contributes towards enhancing the understanding of the topic; motivation behind ERM adoption, across the universe. Thus, the findings of this current paper may be of interest to researchers as a field reference. Moreover, a new measure of corporate governance is introduced in this research which is whether or not the company is listed in S&P/EGX ESG index. The findings of this current paper may also be of interest to practitioners who are implementing ERM and who wish to be kept up-to-date with the process of empirical analysis results and views.

The practical implications for the current study rests in that the findings of the research have significance for regulatory authorities. A better understanding of the relationship between ERM and its determinants informs these authorities about the characteristics and industry sectors of Egyptian companies that chose to adopt ERM. As a result, the study can help policymakers rethink their supervisory role in order to boost the ERM process and enable the full and efficient adoption of effective ERM systems in all Egyptian businesses and in all industry sectors. This is to protect different stakeholders' interests which will in turn increase their confidence in the Egyptian business environment. It will also send a message to

stakeholders that the company is ready with a response plan in case of any crisis and thus, investments can be attracted and maintained.

Moreover, since accountants are found to have a lead role in ERM practices (see section one), understanding determinants of ERM will enable accountants and the accounting profession bodies to enhance their contribution to ERM. This could be through continuous professional training to excel at ERM and upskilling accountants into how to support their organisations in ERM procedures and add more value to ERM programs. All the above will aid in finding a best ERM practice approach which may result in maintaining competitive advantage, enhance capturing opportunities and help achieve the objectives of the company.

However, this study's conclusions are susceptible to various limitations. Because companies seldom disclose any detailed information about their existing risk management strategies or systems in publicly available documents, identifying the fact that a company is employing ERM is a key challenge in ERM research. As a result, proxies and alternative approaches were employed to detect the presence of ERM such as hiring a CRO or existence of a risk committee and examining the financial records of companies in order to look for ERM-related criteria. As a fairly subjective criterion, this technique may have resulted in some bias in the results. There could have been firms that might be using ERM and still could not have been identified. It could also be the case that the presence of a CRO does not imply the implementation of an ERM system. There are, nevertheless, numerous compelling reasons to regard a CRO appointment as a signal. Another crucial element is that, because ERM is still regarded a relatively novel notion in Egypt, the sample of businesses implementing ERM was limited, which may have resulted in some of the outcomes falling short of expectations. Moreover, the small sample size is due to its selection from a population limited to top hundred Egyptian listed companies, in addition to limitation due to data availability.

Future study might overcome the aforementioned limitations by incorporating other indicators of ERM implementation. There is also a need to address the challenge of data collection and shortage of reliable data. In addition, an increase in sample size is crucial by increasing the population to include, for example, all listed companies. Moreover, due to the

importance of understanding determinants behind ERM implementation, further contextual variations in the determinants of an ERM programme could be revealed by larger and more international samples.

6. References

- Aabo, T.; J. R. S. Fraser and B. J. Simkins (2005) "The Rise and Evolution of the Chief Risk Officer: Enterprise Risk Management at Hydro One", *Journal of Applied Corporate Finance,* 17 (3): 62–75.
- Abdul Khalik, Z. and R. Md. Sum (2020) "The Influence of Corporate Governance on Enterprise Risk Management Implementation: A Study on Non-Financial Public Listed Companies in Malaysia", *Journal of Technology Management and Business*, 7 (1): 50-64.
- Abdul Manab, N. and I. Kassim (2012) A Moderating Effect of Leadership on a Success of Enterprise-Wide Risk Management Practices. Proceedings of Third International Conference on Business and Economic Research (Third ICBER 2012), 12 - 13 March 2012. Golden Flower Hotel, Bandung, Indonesia.
- Abdul Manab, N.; I. Kassim and M. R. Hussin (2010) "Enterprise-Wide Risk Management (EWRM) Practices: Between Corporate Governance Compliance and Value Creation", *International Review of Business Research Papers*, 6 (2): 239-252 (July).
- Abu Afifa, M. M. and I. Saleh (2021) "Management Accounting Systems Effectiveness, Perceived Environmental Uncertainty and Enterprise Risk Management: Evidence from Jordan", *Journal of Accounting and Organisational Change*, 17 (5): 704-727.
- Ahmad, S.; C. Ng and L. A. McManus (2014) "Enterprise Risk Management (ERM) Implementation: Some Empirical Evidence from Large Australian Companies", *Procedia—Social and Behavioral Sciences,* 164: 541–547.
- Amato, N. (2021) "A COVID-19 effect: ERM's perceived value grows", *Financial Management magazine*, 2 November. Available at: https://www.fm-magazine.com/news/2021/nov/erm-perceived-value-grows-covid-19.html
- Anton, S. G. and A. E. A. Nucu (2020) "Enterprise Risk Management: A Literature Review and Agenda for Future Research", *Journal of Risk and Financial Management*, 13 (11):1-22 (November), 281.

- Arena, M.; M. Arnaboldi and G. Azzone (2010) "The Organizational Dynamics of Enterprise Risk Management", *Accounting, Organizations and Society,* 35 (7): 659–675 (October).
- Baxter, R.; J. C. Bedard; R. Hoitash and A. Yezegel (2013) "Enterprise Risk Management Program Quality: Determinants, Value Relevance, and the Financial Crisis", *Contemporary Accounting Research,* 30 (4): 1264–1295.
- Beasley, M. S.; D. Pagach and R. Warr (2008) "Information Conveyed in Hiring Announcements of Senior Executives Overseeing Enterprise-Wide Risk Management processes", *Journal of Accounting, Auditing and Finance,* 23 (3): 311–332.
- Beasley, M. S.; R. Clune and D. R. Hermanson (2005a) "ERM: A Status Report; A Study Funded by The IIA Research Foundation Reveals How Far Organizations Have Come in Developing Enterprise Risk Management and Internal Auditing's Role in The Process", *Internal Auditor*, 62 (1), February.
- Beasley, M. S.; R. Clune and D. R. Hermanson (2005b) "Enterprise Risk Management: An Empirical Analysis of Factors Associated with the Extent of Implementation", *Journal of Accounting and Public Policy,* 24 (6): 521–531.
- Beasley, M.; B. Branson and B. Hancock (2009) Report on the Current State of Enterprise Risk Oversight, ERM Initiative at North Carolina State University, Raleigh.
- Berry-Stölzle, T. R. and J. Xu (2018) "Enterprise Risk Management and the Cost of Capital", *Journal of Risk and Insurance,* 85 (1): 159–201 (March).
- Brustbauer, J. (2016) "Enterprise Risk Management in SMEs: Towards a Structural Model", *International Small Business Journal-Researching Entrepreneurship,* 34: 70–85.
- Chaplin, S. (2019) "Enabling the Accountant's Role in Effective Enterprise Risk Management", International Federation of Accountants (IFAC), Surveys and Reports, 07 January. Available at: https://www.ifac.org/knowledge-gateway/preparing-future-ready-professionals/publications/enabling-accountants-role-effective-enterprise-risk-management
- Collier, P.; A. Berry and G. Burke (2006) Risk and Management Accounting: Best Practice Guidelines for Enterprise-Wide Internal

Control Procedures, CIMA Research Executive Summaries Series, 2 (11), The Chartered Institute of Management Accountants (CIMA), London.

- COSO (2004) Enterprise Risk Management—Integrated Framework, New Jersey: COSO (Committee of Sponsoring Organizations of the Treadway Commission). American Institute of Certified Public Accountants (AICPA). Retrieved from https://www.coso.org/Documents/COSO-ERM-Executive-Summary.pdf

- Daud, W. N. W.; A. S. Yazid and M. R. Hussin (2009) Determinants of the Enterprise Risk Management (ERM) Adoption among Malaysian Companies. Retrieved from http://www.anzam.org/wpcontent/uploads/pdf-manager/1164_ANZAM2009-282.PDF

- Daud, W. N. W.; A. S. Yazid and M. R. Hussin (2010) "The Effect of Chief Risk Officer (CRO) on Enterprise Risk Management (ERM) Practices: Evidence from Malaysia", *International Business and Economics Research Journal*, 9 (11): 55–64.

- Daud, W. N. W.; H. Haron and D. N. Ibrahim (2011) "The Role of Quality Board of Directors in Enterprise Risk Management (ERM) Practices: Evidence from Binary Logistic Regression", *International Journal of Business and Management,* 6 (12): 205–211.

- de Zwaan, L.; J. Stewart and N. Subramaniam (2011) "Internal Audit Involvement in Enterprise Risk Management", *Managerial Auditing Journal*, 26 (7): 586-604.

- Desender, K. (2011) On the Determinants of Enterprise Risk Management Implementation. In Enterprise IT Governance, Business Value and Performance Measurement, ed. N.S. Shi and G. Silvius, 88–100. Hershey: IGI Global. Retrieved from SSRN: https://ssrn.com/abstract=1025982

- Eckles, D. L.; R. E. Hoyt and S. M. Miller (2014) "The Impact of Enterprise Risk Management on the Marginal Cost of Reducing Risk: Evidence from the Insurance Industry", *Journal of Banking and Finance,* 43: 246-261 (June).

- Eid, N. M. (2010) Enterprise Risk Management: Corporate Mind Set Creates Value. Enterprise risk management (ERM) Symposium, April 12-15, 2010, Sheraton Chicago Hotel and Towers, Chicago, IL

- Faisal, M. and N. N. Hasan (2020) "Enterprise Risk Management and Firm Value: The Case in Emerging Market", *International Journal of Innovation, Creativity and Change*, 11 (6): 272-286.
- Farrell, M. and R. Gallagher. (2015) "The Valuation Implications of Enterprise Risk Management Maturity", *Journal of Risk and Insurance,* 82 (3): 625–657.
- FERMA (2002) Risk Management Standard. (Federation of European Risk Management Associations) World Wide Web: http://www.ferma.eu
- Florio, C. and G. Leoni (2017) "Enterprise Risk Management and Firm Performance: The Italian Case", *The British Accounting Review*, 49 (1), 56-74.
- Francis, S. and B. Paladino (2008) "Enterprise Risk Management: A Best Practice Approach", *The Journal of Corporate Accounting and Finance*, 19 (3) March/April: 19-33.
- Frantz, M. (2011) How Much Cash is at Risk? Evidence from US Non-Financial Firms. International Conference of the French Finance Association (AFFI), May 2011
- Fraser, I. and W. Henry (2007) "Embedding Risk Management: Structures and Approaches", *Managerial Auditing Journal*, 22 (4): 392-409.
- Gates, S. (2006) "Incorporating Strategic Risk into Enterprise Risk Management, A Survey of Current Corporate Practice", *Journal of Applied Corporate Finance,* 18 (4): 81–90.
- Gatzert, N. and H. Wesker (2012) "A Comparative Assessment of Basel II/III and Solvency II", *Geneva Papers on Risk and Insurance – Issues and Practice,* 37 (3), 539–570.
- Gatzert, N. and M. Martin (2015) "Determinants and Value of Enterprise Risk Management: Empirical Evidence from the Literature", *Risk Management and Insurance Review*, 18 (1): 29–53.
- Golshan, N. M. and S. Z. Abdul Rasid (2012) "Determinants of Enterprise Risk Management Adoption: An Empirical Analysis of Malaysian Public Listed Firms", *World Academy of Science, Engineering and Technology International Journal of Economics and Management Engineering*, 6 (2): 242-249.

- Gordon, L. A.; M. P. Loeb and C.-Y. Tseng (2009) "Enterprise Risk Management and Firm Performance: A Contingency Perspective", *Journal of Accounting and Public Policy,* 28 (4): 301–327.
- Hernández-Madrigal, M.; C. Aibar-Guzmán; B. Aibar-Guzmán and É. Ramírez-Flores (2020) "Are External Pressures Always Behind ERM Implementation? Evidence from Spanish Listed Firms", *International Journal of Disclosure and Governance*, 17: 86–100.
- Hoyt, R. E. and A. P. Liebenberg (2011) "The Value of Enterprise Risk Management", *The Journal of Risk and Insurance,* 78 (4): 795–822.
- Hoyt, R. E. and A. P. Liebenberg (2015) "Evidence of the Value of Enterprise Risk Management", *Journal of Applied Corporate Finance,* 27 (1): 41–47.
- Hoyt, R. E.; D. L. Moore and A. P. Liebenberg (2008) The Value of Enterprise Risk Management: Evidence from the U.S. Insurance Industry, Society of Actuaries, ERM Monograph Paper. Available at https://www.soa.org/globalassets/assets/files/resources/essays-monographs/2008-erm-symposium/mono-2008-m-as08-1-hoyt.pdf
- IIA (2009) "The Role of Internal Auditing in Enterprise Risk Management", Institute of Internal Auditors. Available at: www.iia.org.au/technicalResources/knowledgeitem.aspx?ID=32.
- ISO (2009) ISO 31000—Risk management—Principles and Guidelines. (International Organization for Standardization) Available at https://www.iso.org/obp/ui/
- Johnston, J. and J. Soileau (2020) "Enterprise Risk Management and Accruals Estimation Error", *Journal of Contemporary Accounting and Economics*, 16 (3): 1-15 100209.
- Khan, M. J.; D. Hussain and W. Mehmood (2016) "Why Do Firms Adopt Enterprise Risk Management (ERM)? Empirical Evidence from France", *Management Decision*, 54 (8): 1886–1907.
- Khodair, M. M. A. (2015) "Investigating Enterprise Risk Management (ERM) and its Impacts on Firm Value", *Accounting Thought Journal-Ain Shams University*, 19 (3) Summer: 20-42.
- Kleffner, A. E.; R. B. Lee and B. McGannon (2003) "The Effect of Corporate Governance on the Use of Enterprise Risk Management:

Evidence from Canada", *Risk Management and Insurance Review,* 6 (1): 53–73.

- KPMG (2001) Enterprise Risk Management–An Emerging Model for Building Shareholder Value. World Wide Web: http://www.kpmg.com

- Lechner, P. and N. Gatzert (2018) "Determinants and Value of Enterprise Risk Management: Empirical Evidence from Germany", *The European Journal of Finance*, 24 (10), 867-887.

- Liebenberg, A. P. and R. E. Hoyt (2003) "The Determinants of Enterprise Risk Management: Evidence from the Appointment of Chief Risk Officers", *Risk Management and Insurance Review,* 6 (1): 37–52.

- Lin, Y.; M.-M. Wen and J. Yu (2012) "Enterprise Risk Management: Strategic Antecedents, Risk Integration and Performance", *North American Actuarial Journal*, 16 (1): 1–28.

- Lundqvist, S. A. (2014) "An Exploratory Study of Enterprise Risk Management: Pillars of ERM", *Journal of Accounting, Auditing and Finance*, 29 (3): 393-429.

- Lundqvist, S. A. (2015) "Why Firms Implement Risk Governance - Stepping Beyond Traditional Risk Management to Enterprise Risk Management", *Journal of Accounting and Public Policy,* 34 (5): 441–466.

- Malik, M. F.; M. Zaman and S. Buckby (2020) "Enterprise Risk Management and Firm Performance: Role of The Risk Committee", *Journal of Contemporary Accounting and Economics*, 16 (1): 1-22 (100178), https://doi.org/10.1016/j.jcae.2019.100178.

- Maruhun, E. N. S.; W. R. W. Abdullah; R. Atan and S. N. S. Yusuf (2018) "The Effects of Corporate Governance on Enterprise Risk Management: Evidence from Malaysian Shariah-Compliant Firms", *International Journal of Academic Research in Business and Social Sciences*, 8 (1), 865–877.

- McShane, M. K.; A. Nair and E. Rustambekov (2011) "Does Enterprise Risk Management Increase Firm Value?", *Journal of Accounting, Auditing and Finance*, 26 (4): 641–658.

- Meulbroek, L. K. (2002) "A Senior Manager's Guide to Integrated Risk Management", *Journal of Applied Corporate Finance*, 14 (4): 56–70 (Winter).

- Mikes, A. and R. S. Kaplan (2015) "When One Size Doesn't Fit All: Evolving Directions in the Research and Practices of Enterprise Risk Management", *Journal of Applied Corporate Finance*, 27 (1): 37–40.
- Mohd-Sanusi, Z.; S. Motjaba-Nia; N. A. Roosle; R. N. Sari and A. Harjitok (2017) "Effects of Corporate Governance Structures on Enterprise Risk Management Practices in Malaysia", *International Journal of Economics and Financial Issues*, 7 (1), 6-13.
- Nocco, B. W. and R. M. Stulz (2006) "Enterprise Risk Management: Theory and Practice", *Journal of Applied Corporate Finance*, 18 (4): 8–20.
- Ojeka, S. A.; A. Adegboye; K. Adegboye; O. Alabi; M. Afolabi and F. Iyoha (2019) "Chief Financial Officer Roles and Enterprise Risk Management: An Empirical Based Study", *Heliyon*, 5 (6) June: 1-10 (e01934).
- Paape, L. and R. F. Speklé (2012) "The Adoption and Design of Enterprise Risk Management Practices: An Empirical Study", *European Accounting Review,* 21 (3): 533–564.
- Pagach, D. and R. Warr (2011) "The Characteristics of Firms That Hire Chief Risk Officers", *The Journal of Risk and Insurance*, 78 (1): 185–211.
- Pooser, D. M. and K. A. McCullough (2012) ERM Determinants, Use, and Effects on the Firm. American Risk and Insurance Association Annual Meeting, Minneapolis, MN, August 2012.
- Quon, T. K.; D. Zeghal and M. Maingot (2012) "Enterprise Risk Management and Firm Performance", *Procedia - Social and Behavioral Sciences*, 62: 263-267.
- Razali, A. R.; A. S. Yazid and I. M. Tahir (2011) "The Determinants of Enterprise Risk Management (ERM) Practices in Malaysian Public Listed Companies", *Journal of Social and Development Sciences*, 1 (5): 202-207.
- Shannon, T. (2017) "Roles Accountants Play in Risk Management", *Financial Management magazine*, 22 February. Video available at: https://www.fm-magazine.com/videos/roles-in-risk-management.html#:~:text=Accountants%20should%20be%20leaders%20in,of%20risks%20on%20an%20organisation

- Smith, C. W. and R. M. Stulz (1985) "The Determinants of Firms' Hedging Policies", *The Journal of Financial and Quantitative Analysis*, 20 (4): 391–405.
- Subramaniam, N.; L. McManus and J. Zhang (2009) "Corporate Governance, Firm Characteristics and Risk Management Committee Formation in Australian Companies", *Managerial Auditing Journal*, 24 (4): 316–339.
- Suttipun, M.; W. Siripong; O.-A. Sattayarak; J. Wichianrak and S. Limroscharoen (2018) "The Influence of Enterprise Risk Management on Firm Performance Measured by the Balanced Scorecard: Evidence from SMEs in Southern Thailand", *ASR Chiang Mai University Journal of Social Sciences and Humanities*, 5 (1): 33–53.
- Walker, D. (2009) A Review of Corporate Governance in UK Banks and Other Financial Industry Entities: Final Recommendations. Retrieved   from https://www.accaglobal.com/content/dam/acca/global/PDF-technical/corporate-governance/cdr898.pdf.
- Walker, P. L. and M. L. Frigo (2017) "The CFO as chief risk manager", *Financial Management magazine*, 1 December. Available at: https://www.fm-magazine.com/issues/2017/dec/cfo-as-chief-risk-manager.html?utm_source=mnl:adv&utm_medium=email&utm_campaign=11Dec2017
- Wang, T-S.; Y-M. Lin; E. M. Werner and H. Chang (2018) "The Relationship Between External Financing Activities and Earnings Management: Evidence from Enterprise Risk Management", *International Review of Economics and Finance*, 58: 312-329.
- Waweru, N. and Kisaka, E. (2013) "The Effect of Enterprise Risk Management Implementation on the Value of Companies Listed in The Nairobi Stock Exchange", *Journal of Applied Finance and Banking*, 3: 81–105.
- Yazid, A. S.; A. R. Razali and M. R. Hussin (2012) "Determinants of Enterprise Risk Management (ERM): A Proposed Framework for Malaysian Public Listed Companies", *International Business Research*, 5 (1): 80–86.
- Yazid, A. S.; M. R. Hussin and W. N. W. Daud (2011) "An Examination of Enterprise Risk Management (ERM) Practices

Among the Government-Linked Companies (GLCs) in Malaysia", *International Business Research*, 4 (4): 94–103.

- Zahiruddin, G. and N. Abdul Manab (2013) "Enterprise Risk Management and Value Creation: Initial Findings Amongst Nonfinancial Public Listed Companies in Malaysian Bourse", *Asian Economic and Financial Review*, 3 (7): 913–922.