Factors Affecting Implementation of Enterprise Risk Management: An Exploratory Study among Saudi Organizations

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***Abstract*—Enterprise risk management (ERM) has received significant attention in recent years in order to establish a comprehensive approach for managing different types of events (risks and opportunities) relevant to organizations' strategic objectives. Although the number of ERM implementations among Saudi organizations has grown significantly, there is a lack of knowledge about the key factors to be considered when implementing ERM. Therefore, the purpose of this study is to empirically determine the factors affecting ERM implementation based on how the 44 ERM dimensions, derived from the Committee of Sponsoring Organizations ERM Integrated Framework, were actually implemented in a sample of Saudi organizations. The exploratory factor analysis method is used to analyze a sample of 103 responses received through an online survey questionnaire. The results of the exploratory analysis support the retention of three factors that require specific considerations when implementing ERM, namely, (i) the ERM structure and standards, (ii) the enterprise's portfolio of risks and opportunities, and (iii) risk oversight and corporate governance. This study differs from previous research because it is the first to explore ERM implementation among Saudi organizations and because its findings provide a foundational understanding of the key factors affecting ERM implementation. This study also suggests an ERM implementation framework that addresses identified factors and guides organizations on how to enhance ERM implementation.**

***Index Terms*—Corporate governance, enterprise risk management, exploratory factor analysis, and risk management.**

I. Introduction

The global financial crisis of 2008, the corporate collapses, and the highly publicized accounting scandals were main drivers for abandoning traditional risk management (silo approach) and implementing an enterprise risk management (ERM) approach that is more integrated and comprehensive for managing different types of events (risks and opportunities). There is a clear demand from shareholders and regulators to implement enhanced ERM practices in order to capture the maximum value for organizations [1]. The New York Stock Exchange (NYSE) rules released in 2004 incorporated new corporate governance requirements that mandate audit committees of listed companies to be more involved in risk oversight, including risks beyond financial reporting. The U.S. Securities and Exchange Commission (SEC) released in 2009 also incorporated new requirements mandating risk oversight by company's board of directors. These requirements represent an increased pressure on companies to enhance risk oversight and improve risk management processes to holistically manage risks.

Similar to regulatory requirements issued worldwide, the Capital Market Authority (CMA) in Saudi Arabia released in 2006 Corporate Governance Regulations (CGR) to establish rules and standards that govern the management of joint stock companies listed on the Saudi stock exchange (TADAWUL). The purpose of these regulations is to ensure compliance with governance requirements that would ultimately protect shareholders' rights as well as the rights of stakeholders. More specifically, these regulations set the requirements related to risk management for Saudi publicly listed companies. According to CGR, the boards of directors of Saudi listed companies are seen to hold the primary responsibility for establishing, reviewing, and updating policies and work plans related to risk management. In addition, among the main functions of boards of directors is setting rules for the internal control system, in order to ensure that there are adequate and effective control procedures for risk management to forecast the potential risks facing a company and disclose these risks with transparency [2].

In addition to regulatory mandates issued to improve risk management practices, several risk management frameworks emerged to guide organizations on how to implement ERM, such as the Committee of Sponsoring Organizations (COSO) ERM integrated framework and the International Organization for Standardization (ISO) risk management principles and guidelines [3], [4]. These frameworks and others provide guidelines and specific component structures for implementing ERM.

Differences in ERM implementation precipitated many researchers to investigate and explore ERM in several industries and sometimes in specific countries to understand how organizations attempt to implement ERM. Although the number of ERM implementations among Saudi organizations has grown significantly, there is a lack of knowledge about the key factors to be considered when implementing ERM, which leads to difficulty in focusing on key areas that require specific attention and improvement. Therefore, the research question for this study is as follows. What factors do organizations need to consider when implementing ERM? Answering this research question can make an important contribution to Saudi organizations in terms of improving ERM implementation and ultimately creating value for the business and shareholders. Additionally, answering the research question will make important contributions to emerging research on ERM implementation.

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II. Literature Review

A. Theoretical Foundation of ERM

ERM research studies are evolving, and the theoretical foundations have yet to be fully established. The literature review reveals that there are a few theories that lend themselves to ERM, such as portfolio theory and contingency theory. For example, [5] asserts that the ERM concept originates from portfolio theory. Portfolio theory was introduced by [6] in order to provide a framework for thinking about the collective risk of a portfolio of securities and to help investors manage risks through diversification and asset allocation. Reference [7] posits that managing risks on a portfolio basis creates value for organizations, as it allows management to make informed decisions through the concurrent consideration of the various risks facing an organization. The ERM concept is an extension of portfolio theory and is built on the basis that risks should be measured and managed on a portfolio basis in order to balance them against potential rewards. Therefore, ERM helps to address and manage all types of risks, including financial and nonfinancial risks, facing an organization. This collective approach of combining and consolidating various types of risks minimizes the effects of individual risks compared to overall risks, which results in increased profitability, and productivity through cost savings [5]. Reference [7] also posits that managing risks on a portfolio basis helps to maintain a consolidated view of the various types of risks and creates value for an organization, as it allows management to make informed decisions through the concurrent consideration of the various risks facing the organization.

Other theories, like contingency theory, are also referenced in a few ERM studies to explain how contextual variables are related to ERM implementation [1]. The basic foundation of contingency theory is that there are no universally accepted principles applicable to all situations, but, instead, selected attributes or characteristics are dependent upon another. The theory is broad and applicable to various disciplines and helps researchers to study various aspects of the environment in order to develop related processes that fit the environment [8]. Several ERM researchers argue that factors affecting the level of ERM implementation seem to follow contingency theory. For example, [1] and [9] contend that successful implementation of ERM in practice is contingent upon specific factors. Reference [1] indicates that organizational effectiveness is dependent on establishing an adequate fit between the ERM mix (e.g., risk identification processes, frequency of risk meetings, risk tools, and defined roles for the risk function) and contingent variables. In relation to above discussion and under the premises of contingency theory, this study was conducted from an organizational contingency model perspective in order to explore the factors that influence the design and implementation of ERM.

B. Empirical Research Studies on the Determinants of ERM Adoption

In general, the literature on ERM comprises of two main research streams. The first explores the determinants of ERM adoption, and the second stream investigates the ability of ERM to create value. However, a literature review reveals that no prior studies have investigated the determinants of ERM adoption or its ability to create value for Saudi organizations. Therefore, it is very interesting and motivating for me to explore the application of Western literature to Saudi organizations and to answer specific research question to improve ERM practices among Saudi organizations.

In the first stream of ERM studies, researchers explore a specific firm's contextual variables or determinants driving ERM adoption and tend to search publicly available information to identify signals of ERM implementation, such as the appointments of a chief risk officer (CRO). Because organizations disclose limited information on their ERM practices, researchers assert that CRO hires are a simple proxy for ERM implementation in a company [10], [11]. Reference [12] posits that the existence or hiring of an individual such as a CRO who is charged with the responsibility to implement and coordinate ERM activities demonstrates an organization's intention to adopt and implement ERM.

Reference [10] and [11] investigate the determinants of ERM adoption using publicly available information to search for firms that have made CRO hiring announcements in order to identify ERM implementers. Whereas [10] uses a sample of 26 firms to identify those who have announced the hiring of a CRO, [11] uses a larger sample of firms (n=138) and a wider range of determinants relevant to financial, market, asset, and managerial characteristics. Research findings from both studies reveal that firms that are larger in size as well as those with more volatile operating cash flows and stock are more likely to appoint a CRO and adopt ERM. Although [13] uses a survey approach instead of searching public information to explore the determinants of ERM adoption for a sample of US and international organizations, their research results also reveal that the entity size is one of the key determinants of ERM adoption. They argue that as the size of an organization increases, it is assumed that the scope of the risks it faces is more likely to increase, taking into consideration the nature, timing, and extent of different types of events threatening the organization. Researchers investigating the determinants of ERM adoption tend to agree that entity size is one of main factors driving ERM implementation but they also identify additional factors for ERM adoption. For example, [13] concludes that board independence, senior management (e.g., chief executive officer and chief financial officer support for ERM), and auditor type are key determinants of ERM adoption.

However, I would argue that studies of the determinants of ERM adoption lack a comprehensive approach to explore how ERM is actually implemented in practice. For example, [10] and [11] use simple proxies (i.e., appointments of a CRO) to identify ERM implementers. However, this approach is too superficial to explore the level of ERM implementation because a CRO appointment provides limited information about the quality and depth of an organization's risk management processes [14]. The existence of the CRO does not clarify the level of support and leadership from the chief executive officer (CEO) and the board of directors in terms of risk information production and dissemination across the organization nor does it clarify how resources are dedicated to mitigate and control the principal risks [1]. In addition, some organizations might have good ERM practices but have not appointed a CRO. In this case, these organizations will be judged as not having implemented ERM when in actual fact

they have.

C. Empirical Research Studies on the Ability of ERM to Create Value

Most literature on risk management explores the value adding ability of risk management based on how organizations manage their financial risks using examples of financial instruments, such as derivatives, to hedge. However, there is very little empirical evidence on the value adding ability of ERM that considers the effects of both financial and nonfinancial risk management practices on organizations. A strong theoretical basis emerges from the literature on the ability of ERM to create value and improve organizational performance. For example, [15] argues that ERM implementation adds value by reducing potential losses, earnings, and stock price volatility as well as improving the return on capital. These arguments drive scholarly interest in ERM in order to investigate whether ERM can contribute to better firm performance and has the ability to create value. However, the results of the empirical tests conducted to-date exploring the relationship between ERM implementation and firm performance are controversial, and the research outcomes vary from one study to another [1]. There are no definitive or general statements about the financial benefits related to ERM implementation [16].

Researchers investigating the ability of ERM to create value tend to apply different approaches to identify ERM implementers and explore the level of implementation. For example, [16], [17], and [18] use CRO appointments as a proxy for ERM implementation in order to investigate the ability of ERM to create value. However, these research studies report mixed results. For example, [16] explores the market reaction to a sample of 120 CRO appointments from different industries (i.e., financial services, insurance and energy) in the US and observes a positive stock market reaction to the appointment of a CRO among nonfinancial companies. Reference [18] also finds a positive relationship between ERM implementation and company value for a sample of 117 US publicly traded insurers, where company value is measured using Tobin's Q, which is the book value of liabilities plus the market value of equity divided by the book value of assets. However, [11] examines the effect of ERM implementation on firm performance for a sample of 106 US publicly traded financial and utility firms and find no significant changes in firm performance variables (i.e., earnings volatility, stock price volatility, leverage, return on equity, opacity, and growth options) leading them to conclude that ERM did not add observable value.

The variations in the results of the above studies could occur for two main reasons. First, all studies use the appointment of a CRO as a proxy for ERM implementation, which is criticized as inadequate to identify true ERM implementers. Because this proxy is superficial and is too oversimplified to identify true ERM implementers and capture to what extent the ERM framework and processes are actually implemented in an organization [14]. Second, the effect of ERM implementation is assessed against different measures of organizational performance. Whereas [16] uses market reactions represented by stock prices as a measure of firm performance, [18] measures firm value using Tobin's Q. Additionally, [17] measures firm performance using specific financial variables. Therefore, using inconsistent measures of organizational performance creates difficulty in arriving at convincing results regarding ERM's ability to create value.

Instead of using CRO appointments as a proxy for ERM implementation, readily available criteria by rating agencies, such as Standard & Poor's (S&P) ERM rating, are used as a proxy for ERM implementation. The ERM rating is newly added to the eight components that S&P uses to rate the financial strength of insurers [19]. For example, [20] and [21] use S&P ERM ratings as a measure of the level of ERM implementation and Tobin's Q as a measure of the firm value. However, the results on the relationship between ERM implementation and firm value are controversial. Reference [20] investigates the relationship between ERM implementation and firm value for a sample of 82 publicly traded US insurers and finds a positive relation between the S&P ERM rating and firm value. However, using similar measures (i.e., the S&P ERM rating and Tobin's Q) to investigate the association between ERM implementation and firm value for a sample of 165 banks and insurers, [21] concludes that ERM implementation does not lead to higher firm value.

The main reason for the differences in these research outcomes is related to the originality and reliability of the S&P ERM rating to measure the level of ERM implementation. Although S&P is an internationally recognized credit rating agency, the ERM rating criteria are not derived from one of the internationally recognized risk management frameworks, such as COSO or ISO. In addition, S&P uses its own definition of ERM, which may lead to different interpretations across researchers. Reference [14] argues that the S&P ERM rating is limited to insurance companies and has not been examined for its appropriateness for ERM studies. Reference [20] indicates that the business relationships between financial rating agencies and clients might affect the objectivity of the rating results.

Due to the limitations and inaccuracies of the previously presented proxies for ERM implementation (i.e., CRO appointments and S&P ERM ratings), other researchers attempt to develop their own measures derived from the COSO framework to explore the level of ERM implementation. For example, [22] develops eight ERM components and test the relationship between these components and firm performance for a sample of 150 audit and risk management executives. Reference [9] develops another measure, called the ERM Index, to explore the effect of ERM implementation on firm performance based on one-year excess stock market returns for a sample of 112 US firms. The outcomes of both studies reveal that there is a positive relation between ERM implementation and firm performance.

D. Dimensions of ERM for Measuring the Degree of Implementation

In addition to the two research streams presented in the previous sections, there is an emerging stream of ERM research studies that focuses on using a more comprehensive approach to capture and understand how ERM is implemented in organizations [1]. Researchers embracing such an approach attempt to use multiple dimensions to

compile sufficient evidence to assess and measure the degree of ERM implementation. Reference [23] is one of the first researchers to construct an aggregate measure of ERM. The aggregate measure consists of 70 ERM dimensions derived from the COSO framework and a prior study by [24] with the aim to test the degree of ERM implementation. In a study investigating the relationship between board composition and ERM practices, [23] searches publicly available information from 2004 annual reports to measure ERM implementation for 100 publicly listed organizations that operate in the pharmaceutical industry. Instead of using a single event, such as the appointments of a CRO, as a proxy for ERM implementation, an aggregate measure of ERM is used to explore to what extent the elements of the COSO framework are implemented. Each dimension in the ERM measure is given a score of one when the firm provides the information and zero otherwise. The research results reveal that firms that demonstrate the highest level of ERM implementation have an independent board of directors and separation between the CEO and the chairman.

In another study, [14] reviews the original list of ERM dimensions from [23] study and develops a refined list. The refined list contains 59 ERM dimensions and is used in a comprehensive survey questionnaire over a sample of 151 Nordic firms to explore how these firms actually implement ERM. Exploratory factor analysis (EFA) is used to identify underlying factor structures, whereas confirmatory factor analysis (CFA) is used to evaluate a priori ERM component models. Based on how sample firms implement the ERM dimensions, the research results reveal four essential components or pillars of ERM implementation. Two components are related to the general internal environment and general control activities, whereas the third component is related to identifying risk management activities and the fourth component to defining the attributes of ERM implementation. Reference [14] asserts that organizations should implement the four pillars or components in order to have a well-implemented ERM.

Although the majority of empirical studies attempt to explore and investigate ERM implementation using publicly available information or surveys, [1] argues that ERM studies produce few significant results due to limited fieldwork assessments to investigate actual risk management practices. In order to produce a complete and adequate assessment of how ERM is used and implemented in practice, [1] executes a ten-year fieldwork project using three case studies and conducting more than 250 interviews with senior management and CROs. Instead of recommending a universal risk management system or specific dimensions, the outcomes of the study recommend a contingency framework for ERM. The contingency framework recommends establishing an adequate fit between ERM design parameters, known as the ERM mix, and contingent variables in order to achieve organizational effectiveness. The ERM mix includes risk identification processes, the frequency of risk meetings, risk tools and defined roles for the risk function, and the contingent variables are risk types (preventable, strategy and external) and other organizational and industry variables [1].

III. Research Design and Methodology

A. Research Methods Overview

This study uses quantitative methods, mainly surveys and EFA. The ERM dimensions used to develop the survey instrument and conduct quantitative analysis were built on the work of [14]. The original dimensions used in [14] study were modified to focus on only 44 dimensions covering five main areas as shown in Fig. 1. A Likert scale that consists of four ratings is used to explore the implementation level of each dimension. I also developed a conceptual model to guide the study, in which the actual implementation of the 44 ERM dimensions among Saudi organizations will be explored in order to identify key factors affecting ERM implementation.

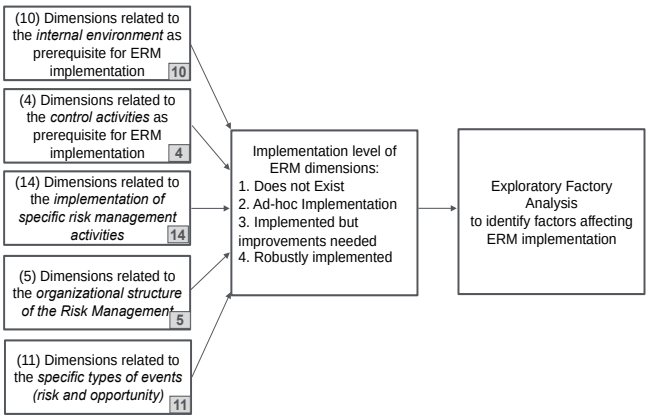

Fig. 1. Research conceptual model.

B. Data Collection

A survey questionnaire is used to collect responses directly from research participants to explore how the 44 ERM dimensions are actually implemented among a sample of Saudi organizations. The data collection process is designed in a way to obtain responses from participants with relevant experience in the fields of either risk management, finance or internal auditing who work in publicly and nonpublicly traded Saudi organizations. LinkedIn was the main channel used to identify participants who meet the sampling criteria and to distribute surveys.

C. Research Population and Sample

Risk management professionals and leaders working in publicly and nonpublicly traded Saudi organizations were the ideal candidates for this study. However, participation in this study was expanded to include participants at managerial levels in other functions, such as finance and internal audit. The organizations' CEOs, chief financial officers (CFOs), and leaders from internal audit functions are targeted in addition to risk management professionals and leaders because they tend to have the required knowledge to respond to the survey questionnaire. For example, CEOs and CFOs are eligible candidates because they play a key role in setting the tone at the top, which influences the internal environment and relevant ERM components [3]. In addition, individuals with an internal audit background have the required knowledge about risk management practices and are considered eligible candidates because they are given the responsibility of evaluating the adequacy of risk management

programs and providing assurance on the implementation of risk mitigation plans.

Having defined the population for this study, which includes the entire set of participants eligible to answer the research questionnaire, the next step is to define how to draw a representative sample from the population. To achieve a representative sample, LinkedIn was used as the main source to search for individuals with relevant job titles such as CEO, CFO, CRO, and Chief Audit Executive (CAE). LinkedIn also helped to review the profile of each participant to ensure that the sampled participants have the required risk management knowledge to answer the survey questionnaire. When the above job titles were not available, I attempted to search for less senior job titles with risk management responsibilities, such as Director of Risk Management, Senior Risk Manager or Risk Manager.

In order to make sure that the LinkedIn membership is representative of the entire population, a list of all Saudi companies listed on TADAWUL, was obtained from the Saudi stock exchange website, which includes 167 publicly traded Saudi companies, in order to confirm and crosscheck that at least one participant from each company has an active LinkedIn account. In addition, a specific question on the current title/position of participants was included at the beginning of the questionnaire to control questionnaire respondents and to ensure that responses are distributed to and received from participants with relevant knowledge on risk management activities. Doing so also helps to understand the demographics of participants.

D. Characteristics of the Collected Sample

This research was designed to collect primary data only using survey questionnaire, which was administered through an online web-based tool through SurveyMonkey. A total of 366 survey questionnaires were sent to research participants, and only 129 participants submitted their responses during the collection period. These responses were filtered so that only 103 responses were used in the data analysis process with a response rate of 28.1%. Comparing the response rate of this study to other ERM research studies, the literature review reveals that response rates of ERM studies range from 10% - 27%. For example, the response rates for research studies by [13], [14], and [22] were 10.3%, 22.6%, and 27%, respectively. Although the response rate of this study is low, it is within the range of the response rates for prior ERM research studies.

To gain more insights in the collected sample, participants were asked to specify the primary industry of their organization. Although the individuals who participated in this study are from a wide range of industry sectors, around 23% of them are from banking and insurance and 34% are from the oil, gas, and petrochemical industry. It is not surprising that majority of the survey responses are from these organizations because these industries are more likely to implement ERM programs. In addition, around 40% of the participants are from organizations that have an annual revenue between 1 Billion – 10 Billion Saudi Riyal (SAR), where 1 USD equals 3.75 SAR.

Individual characteristics, such as position/job title and degree of familiarity with risk management activities at an organization, were also collected to confirm the relevance of each submitted survey. Of the total respondents, 29% hold roles within the risk management function as a CRO, vice president (VP), general manager (GM) or manager, 24% hold roles within the internal audit function as a CAE, director, manager or auditor, 9.7% hold roles within the finance function as a CFO, VP or director, and 10.7% prefer not to indicate their functional assignment.

With the objective to gain insights into how organizations attempt to implement their ERM programs, participants were asked to specify if the organization's ERM framework was developed according to one of the international risk management standards or if it was created internally. Of the 103 participants that completed the survey, 69 respondents (67%) indicate that their organization adopted a formalized risk management program according to one of the international risk management standards, such as COSO framework, ISO framework, the Turnbull guidance, and Basel II. However, 17 respondents (16.5%) indicate that their organization created its own risk management framework. This result indicates fairly wide adoption of a formalized ERM among Saudi organizations.

E. Design of the Survey Instrument

In this study, the survey instrument by [14] was leveraged to investigate ERM implementation among Saudi organizations and to explore factors affecting implementation. Permission was obtained from [14] prior to using the survey instrument for this study. The questionnaire was modified in a way that would not impact the original components of the ERM dimensions. The final version of this study's questionnaire consists of 52 questions, including ERM dimensions, individual data, and organizational data. Participants were asked to rate the degree of implementing each ERM dimension in their organization over the last three years instead of in a specific year.

F. Data Analysis: Methods and Statistical Techniques

Factor analysis was used in this study to explore the factors affecting ERM implementation. Factor analysis is a broad term used widely in the literature, but it represents a variety of methods and statistical techniques [25]. It is a multivariate statistical procedure and cyclical process that uses matrix algebra for its calculations. The basic statistic used in factor analysis is the correlation coefficient, which helps to determine the interrelationships (correlations) among a large number of measured or observed variables in order to determine the possibility of summarizing these relationships in a smaller number of latent or unobserved constructs [26], [27]. Factor analysis helps to reveal latent variables, known as factors, that cause covariance between measured variables but once these factors are identified or extracted, there are no intercorrelations between any pairs of variables because the factors themselves account for the intercorrelations [27]. Reference [28] asserts that one of the key advantages of factor analysis is determining a theoretical construct that can represent the original variables. This construct can be achieved by removing redundant information and noise induced by measurement errors.

In this study, a total of 44 dimensions are used to explore ERM implementation. The correlation matrix for this study yields a substantial number of large correlations among the

research variables. Reference [29] asserts that a correlation among research variables above 0.30 strongly indicates that factor analysis is an appropriate statistical methodology. In this study, the correlation among the research variables exceeds 0.30, which confirms the appropriateness of the factor analysis technique for this analysis in order to analyze a large number of variables that are highly correlated with a smaller number of factors. Additionally, researchers, like [14] and [30], who were the first ones to explore ERM implementation in the Nordic countries and Malaysia, respectively, use specific ERM dimensions and apply factor analysis to explore the underlying factor structure related to ERM implementation. This is the first study exploring ERM implementation in Saudi organizations, so exploratory methods are more appropriate for this study than are other methods.

Two methods of factor analysis, EFA and CFA, are available for researchers to explore and confirm the underlying factor structure of a data set. EFA is a data-driven technique and is used to explore and determine the number of factors and the pattern of factor loadings in absence of theory to drive the analysis [31]. In contrast, CFA is driven by theoretical expectations regarding the structure of data and is normally used to test a quantitatively defined theory or model [32], [26]. In the data analysis step of this research, only EFA is used, because this study is the first conducted in Saudi Arabia investigating ERM implementation, and due to the lack of theoretical and empirical evidence related to the factors affecting ERM implementation among Saudi organizations, no sufficient basis was available to identify a priori models in order to test them using CFA.

Factor extraction and factor rotation are main steps applied in factor analysis in order to test different factor structure models. The purpose of the factor extraction or retention step is to determine the optimum number of factors to extract in order to produce a factor structure that provides insights into the data [31]. Several rules, strategies or criteria are recommended in the literature for deciding the number of factors to extract or retain for factor rotation, such as the eigenvalue (EV) rule or Kaiser criterion, the scree plot, and parallel analysis. It is recommended to use more than one strategy or rule to test and confirm the number of factors to extract. The EV rule is the most frequently used criteria for factor retention. Based on this rule, the decision-making strategy states that any factor with an EV greater than 1 should be extracted but with the condition that each factor should consist of more than variable [33]. The other test to confirm the number of factors to retain is the scree plot, which provides a graphical representation of the EV. The scree plot helps to identify the break point in the data in terms of where the curve displayed in the graph flattens out. The number of factors to retain should be above the break point but should not be the point where the bend occurs [31]. Other researchers like [28] assert that parallel analysis (PA) is the most accurate procedure to determine the number of factors to retain. Reference [31] indicates that the choice of the number of factors to retain is based on the notion that the EV of factors from the original data should be greater than the EV obtained from random data.

The purpose of the factor rotation step is to simplify and clarify the data structure to make the representation of measured variables more interpretable without changing its original mathematical properties. It helps researchers to determine which measured variables load adequately onto a specific factor based on defined factor loading value. The factor loading value sets a minimum value based on which the variables that will be retained in the factor structure, which was set to 0.50 in the data analysis and any variable with a value less than that was removed from the final results. In addition, factors should be reviewed because any factor with less than three variables loading is considered a weak and unstable factor [29]. Because of this requirement, several runs of EFA were conducted in order to ensure that at least three variables were loading to each factor.

There are two methods for factor rotation: the orthogonal method, which is based on the assumption that the factors are uncorrelated, and the oblique method, which is based on the assumption that factors are correlated. Furthermore, several factor rotation techniques are available for each method. Varimax and promax are the recommended techniques for the orthogonal and oblique factor rotation methods, respectively. In this study, oblique factor rotation with the promax technique was used for the test run of EFA. The main reason for using oblique factor rotation is that it produces additional matrices, namely, structure and pattern matrixes, which depict unique relationships or loading between variables and each factor, whereas orthogonal factor rotation only produces a loading matrix that shows correlations between observed variables and factors [29].

IV. Empirical Results and Discussion

A. Validating the Adequacy of Data for Applying EFA Techniques

Prior to starting the data analysis process, the data were reviewed to prepare for EFA and to confirm that collected data were ready and suitable for conducting EFA. The following steps were followed in order to prepare and confirm the adequacy of the data for EFA:

1) *Categorizing responses:* for each dimension in the original survey, participants were requested to rate the degree of implementation for each ERM dimension using a Likert scale. In preparing the data for analysis using IBM SPSS 23, the Likert scale in the original survey was converted to numerical values ranging from one to four. However, all questions rated as (do not know) are treated in the analysis as missing data, and no numerical value was provided.
2) *Screening and testing variables for missing data:* some questions in the survey were not answered. Participants may have marked these questions as (do not know) or may have missed answering some of the questions. The missing data for this sample was analyzed using SPSS's missing value analysis function to validate if data is missing completely at random (MCAR), missing at random, or missing not at random [29]. The analysis reveals that the total number of missing data points (i.e., questions marked do not know or not answered) is 116, which is equivalent to 2.5% of data set. The analysis confirms that the missing data is not significant (χ^2 = 1195, p = 0.24) and that there is no identified trend.

Therefore, questions with missing answers or those marked as (do not know) were dealt with as MCAR. The option selected for dealing with missing data in the subsequent factor analysis is the Listwise option, which is the default option in IBM SPSS 23.

3) *Testing the reliability of the survey instrument:* Cronbach's alpha was used to measure the consistency of responses related to the degree of ERM implementation based on the COSO framework. The 44 ERM dimensions have a Cronbach's alpha of 0.976, which is greater than 0.70, the typical definition of acceptable reliability.
4) *Testing the correlation among research variables:* as indicated earlier, a high correlation among research variables is a strong indication that factor analysis is an appropriate statistical methodology to apply in a study [29]. The correlation matrix of all 44 variables yielded a substantial number of large correlations among the research variables, which validates the adequacy of using factor analysis in this study. However, [29] asserts that extreme correlation between variables (correlation > 0.90) is a problem when conducting factor analysis. Therefore, before applying EFA, the data were analyzed in order to identify evidence of very extreme correlation among the ERM dimensions in order to eliminate redundant variables. The correlation matrix does not reveal variables with correlation above 0.90.
5) *Examining data for skewness and kurtosis:* according to [34], it is recommended to test the distribution of variables to ensure that the skewness is less than two and the kurtosis is less than seven in order to avoid severe nonnormality. This test was conducted and revealed that the skewness and kurtosis values of the data are within the acceptable limits as shown in Appendix I, which provides confirmation that EFA can be used for the data.
6) *Testing the adequacy of the sample size for EFA:* reference [27] asserts that the sample size should be tested in order to confirm its adequacy for conducting EFA. The KMO value, Bartlett's test of sphericity and communalities were reviewed and validated. The KMO value, which is a measure of sampling adequacy, shows a value of 0.832, which is greater than 0.50, indicating that the data is a homogeneous collection of variables that is suitable for EFA [27]. Bartlett's test of sphericity (χ^2 = 2532, df 703, P <0.001) is significant [35], indicating that the correlation between dimensions is sufficient to use EFA. The communality of a variable, which represents the variance accounted for by a factor, was also reviewed and validated to confirm the adequacy of the sample size for EFA. The data used in this study produces high communalities with a mean of 0.70 as shown in Appendix I, indicating that the sample size is adequate and does not pose a limitation to applying EFA [36], [27].

B. Testing Different Factor Structure Models

To explore and identify the best factor structure model that can provide an accurate representation of the data, there are several factor extraction techniques available for researchers, such as principal components analysis, maximum likelihood (ML) and image factoring. In the data analysis step, ML was selected for factor extraction because it produces the optimum results when conducting factor analysis due to its formal statistical foundation. This foundation provides the researcher with more capabilities in terms of statistical inference, including significance testing and determination of the confidence level.

TABLE I: PATTERN MATRIX FOR THE FIRST RUN OF EFA

Dimension	Factors						
	1	2	3	4	5	6	7
D1				0.51			
D2				0.55			
D4			0.73				
D5							0.69
D6			0.84				
D7			0.68				
D12					0.63		
D13					0.76		
D15	0.64						
D16	0.86						
D17	0.75						
D18	0.74						
D19	0.64						
D20	0.87						
D21	0.84						
D22	0.72						
D23	0.74						
D24	0.67						
D26	0.88						
D27	0.78						
D28	0.73						
D30	0.55						
D31	0.65						
D32	0.51						
D33	0.60						
D34		0.53					
D35		0.83					
D38		0.64					
D39		0.65					
D40		1.03					
D41		1.09					
D42						0.60	
D43						0.73	
D44		0.61					

In the first run of EFA and based on the Kaiser criterion test, the total number of factors to retain is seven as shown in Table I. However, the scree plot confirms that the total number of factors to retain is three as shown in Fig. 2. The PA test was also conducted for the 44 dimensions where the EV of factors obtained from the original data was compared with the EV of factors obtained from random data, and the results reveal that the number of factors to retain is three.

After confirming the number of factors to extract, the pattern matrix Table I was reviewed to interpret the variable loading of each factor. As indicated earlier, the minimum value for variable loading was set at 0.50, so that variables with a loading value of 0.50 or above were considered significant, and variables with a loading value less than 0.50 were dropped from the resulting factor structure [29]. In conclusion, there is strong evidence that a seven-factor structure is weak and difficult to interpret because factors (four, five, six, and seven) are weak and unstable. The pattern matrix Table I shows that only two dimensions load to factors

(four, five and six) and only one dimension loads to factor (seven). Reference [29] asserts that a factor with less than three variables loading is considered weak and unstable.

Based on the above results, a second run of EFA needs to be conducted to produce a stronger factor structure model that can be interpreted and is theoretically sensible. Because factors (four, five, and six) have a low number of dimensions loading, as illustrated in the first run, they were removed in the second run, and the number of factors to retain was set at three. The reason for setting the number of factors to retain at three is that researchers like [33] recommend removing the problematic factors and rerunning the factor analysis when it is difficult to interpret data or the loading table looks messy.

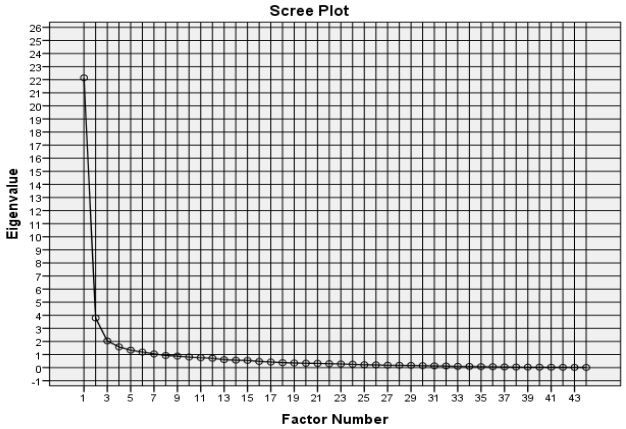

Fig. 2. Scree plot for the first run of EFA.

In the second run of EFA, the same 44 dimensions were used to rerun EFA with the number of factors to retain set to three in SPSS. Therefore, the EV criterion was not used in this analysis. Only the scree plot, PA and the interpretation of the pattern matrix were reviewed to validate the adequacy of the resulting factor structure.

TABLE II: PATTERN MATRIX FOR THE SECOND RUN OF EFA

Dimension	Factors		
	1	2	3
D2			0.52
D4			0.55
D6			0.68
D7			0.55
D10			0.55
D11			0.69
D12			0.85
D13			0.71
D14			0.58
D15	0.57		
D16	0.87		
D17	0.70		
D18	0.67		
D19	0.59		
D20	0.83		
D21	0.91		
D22	0.80		
D23	0.82		
D24	0.77		
D26	0.95		
D27	0.87		
D28	0.72		
D29			0.51
D30	0.59		
D31	0.68		
D32	0.52		
D33	0.65		
D34		0.74	
D35		0.93	
D36		0.60	
D37		0.64	
D38		0.63	
D39		0.70	
D40		0.98	
D41		1.02	
D43		0.53	
D44		0.68	

A review of the outputs for the second run of EFA provides strong evidence that the three-factor structure demonstrates a stronger representation of the ERM dimensions and is more interpretable and theoretically sensible compared to the seven-factor structure model produced in the first run of EFA. The following are the key observations on the results of the analysis:

1) The scree plot for this run shows that the break point occurs at factor four where the curve flattens out. This result indicates that the total number of factors to retain in this case is three as shown in Fig. 3. This is consistent with the output from the first run. We can conclude that the scree plot always confirms that the data can be represented in a three-factor structure model.
2) PA also confirms that the data can be represented in a three-factor structure model.
3) All the dimensions resulting from the three-factor structure are loading strongly (with loading value > 0.50) to their respective factor as shown in Table II.
4) No dimension cross loading is observed between factors, which also confirms the strength of the factor structure produced in the second run of EFA.

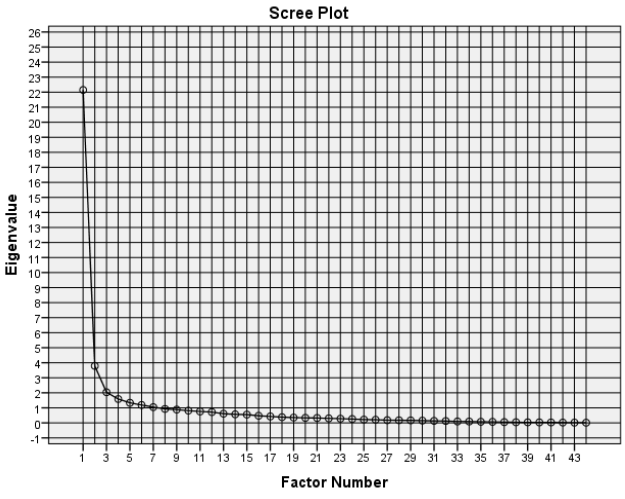

Fig. 3. Scree plot for the second run of EFA.

C. Interpretation and Discussion of the Resulting Three-Factor Structure

After considerable examination of several results of the factor structure models presented in the previous section, the three-factor model was deemed the best fitting model and superior to other models. The final model resulting from the EFA eliminated a total of seven ERM dimensions. This result means a total of 37 ERM dimensions loading to three factors are retained for further analysis. These dimensions were examined to determine the appropriate name of each factor, taking into consideration theory and research results currently available in the literature.

The first factor is named *ERM structure and standards* because the 17 ERM dimensions loading to this factor, as shown in Table III, contain important elements related to the ERM organization structure and standards, which appear to have a significant impact on ERM implementation. The literature review confirms that these two elements play a key role in ERM implementation. For example, a study by [12] conducted for a sample of Canadian companies confirms that organizational structure is one of the main factors affecting ERM implementation. In terms of the importance of ERM standards, [1] concludes from a ten-year field study that current guidance and tools on how to implement a company-wide risk management framework and processes are immature and still emerging. Reference [1] asserts that the success of ERM implementation depends on an adequate fit between ERM design parameters known as the ERM mix and other contingent variables. They refer to the ERM mix as risk identification processes, risk tools and role of the risk function.

The second factor is named *enterprise's portfolio of risks and opportunities* because this factor represents the importance of having a comprehensive portfolio of different types of events (risks and opportunities) relevant to strategic objectives. It includes ten ERM dimensions, as shown in Table IV, which appear to have a significant impact on ERM implementation. The literature review confirms that having enterprise's portfolio of risks and opportunities play a key role in ERM implementation. For example, [37] asserts that one of the key objectives of ERM is increasing the likelihood of achieving strategic objectives and supporting the board of directors and senior management in making informed decisions. Thus, the objectives of ERM cannot be achieved without establishing a portfolio approach in which different types of events are collated and aggregated in order to have adequate awareness at the corporate level about key risk events facing the organization [12]. However, organizations differ in categorizing their risks. For example, whereas financial organizations use categories, like credit, market, liquidity and interest rate to classify their risks [38], others use different categories like strategic, reporting, operation and compliance, to align with COSO framework's four objectives [9]. The ultimate objective is streamlining risk identification and categorization processes in order to reflect the true picture to the board of directors and senior management in terms of the principal risks facing the organization. Therefore, maintaining a comprehensive and active list of key events affecting strategic objectives is important for ERM implementation. The dimensions retrieved under this factor relate to considerations of financial, strategic, compliance, operational, and reputational events.

TABLE III: ERM DIMENSIONS FOR FACTOR 1 "ERM STRUCTURE AND STANDARDS"

Dimension	Description
D15	Determined correlations and portfolio effects of combined risks
D16	Determined quantitative impacts risks may have on key performance indicators
D17	Formal report submitted to the board level at least annually on the current state of risk and effectiveness of risk management
D18	Key risk indicators or indicators aimed at emerging risks (not historical performance)
D19	Centralized technology-enabled process to obtain risk-related information
D20	Verification of the completeness, accuracy, and validity of risk-related information
D21	Formal policies and procedures about how risks should be managed
D22	Risk response plans for all of the significant events the organization has identified
D23	Communication to all stakeholders, internal and external, of the importance of risk management
D24	Formal training about the organization's risk management program
D26	Frequent and structured updates of risk-related information
D27	Formal written risk management philosophy (policy)
D28	Formal written statement of the organization's risk appetite
D30	A senior manager designated with the responsibility to oversee risks and risk management activities
D31	Centralized department or staff function dedicated to risk management
D32	Internal risk assessment group or internal audit function given the responsibility to evaluate the on going effectiveness of the organization's risk management
D33	Allocated risk owners who have primary responsibility and accountability for managing risks within their respective areas

TABLE IV: ERM DIMENSIONS FOR FACTOR 2 "ENTERPRISE'S PORTFOLIO OF RISKS AND OPPORTUNITIES"

Dimension	Description
D34	Consideration of financial risks and opportunities
D35	Consideration of the likelihood and potential impact of financial risks and opportunities affecting the achievement of strategic objectives
D36	Consideration of strategic risks and opportunities
D37	Consideration of the likelihood and potential impact of strategic risks and opportunities affecting the achievement of strategic objectives
D38	Consideration of compliance risks and/or opportunities
D39	Consideration of the likelihood and potential impact that compliance risks and/or opportunities will have on the organization's ability to achieve its objectives
D40	Consideration of operational risks and opportunities
D41	Consideration of the likelihood and potential impact that operational risks and/or opportunities will have on the organization's ability to achieve its objectives
D43	Consideration of the likelihood and potential impact that reputation risks and/or opportunities will have on the organization's ability to achieve its objectives
D44	Consideration of different types of risk and opportunity events prior to strategic decisions

The third factor is named *enterprise risk oversight and corporate governance* because the ten ERM dimensions loading to this factor, as shown in Table V, include

dimensions related to the importance of having defined risk oversight responsibilities and corporate governance requirements. The literature review confirms that having an adequate enterprise risk oversight and corporate governance play a key role in ERM implementation. For example, [37] asserts that many organizations attempt to assign risk oversight responsibilities to a committee of the full board of directors in order to oversee risk management activities in the organization. This finding is an indication that risk oversight is evolving and having a significant impact on the success of ERM implementation. Furthermore, risk oversight responsibilities are not limited to the board of directors. Other functions in the organization contribute to risk oversight responsibilities, such as internal audit. For example, the NYSE introduced new requirements defining specific risk oversight obligations for the audit committees of companies listed on the NYSE.

The other key area in the third factor is corporate governance, which appears to encourage ERM implementation. The importance of corporate governance and its contribution to ERM implementation was highlighted in several research studies, especially after many large corporate failures. For example, [12] asserts that publicly traded companies in several countries attempted to set stricter corporate governance rules in the 1990s in response to these failures. At the same time, these corporate governance rules put greater emphasis on the benefits of ERM to strengthen the organizational approach for managing different types of risks.

Furthermore, the conclusion on the effect of corporate governance on ERM implementation in this study is driven by the corporate governance regulations issued by the Saudi Capital Market Authority. The regulations require the board of directors of each publicly traded Saudi organization to establish a risk management policy at the corporate level, and the board of directors are seen as holding the primary responsibility for the establishment and implementation of the risk management policy.

TABLE V: ERM DIMENSIONS FOR FACTOR 3 "ENTERPRISE RISK OVERSIGHT AND CORPORATE GOVERNANCE"

Dimension	Description
D2	Training in ethical values for employees of all levels
D4	Formally defined responsibilities for executive management including authority and accountability
D6	Formally defined audit committee responsibilities
D7	Formally defined corporate governance requirements
D10	System to ensure that policies and procedures that are in place to manage the achievement of the organization's objectives/plans are functioning and effective
D11	Authorization procedures in place to ensure appropriate individuals review the use of policies and procedures
D12	Independent verification process/procedures to ensure the use of policies and procedures
D13	Channels of communication to report suspected breaches of code of conduct/ethics, laws, regulations, and other improprieties
D14	Monitoring of the organization's internal environment, processes, and control activities
D29	Board level committee with responsibility for risk management oversight

V. Research Suggestions and Implications

Based on the empirical evidence, I suggest an ERM implementation framework that addresses the identified factors and guides organizations on how to improve ERM implementation. The suggested framework consists of three elements defined by their relevant dimensions, which require specific consideration when implementing ERM. The suggested ERM implementation framework also provides a structured approach to conduct a comprehensive review of the ERM program with more focus on areas that are considered important for the successful implementation of ERM. The following are the three elements of the suggested framework with their relevant dimensions:

1) *Establish a holistic ERM structure and define implementation standards:* this element of the framework suggests establishing a holistic structure for the ERM organization in order to build and maintain a robust ERM framework. It also suggests defining specific ERM standards in order to clarify how ERM will be implemented across the organization. This element consists of 17 dimensions as shown in Table III.
2) *Establish the enterprise's portfolio of risk and opportunity events (i.e., financial, strategic, compliance, operational and reputational) affecting the achievement of strategic objectives:* among the different categories of risks and opportunities available for classification, this element of the framework suggests that organizations establish and maintain an enterprise portfolio that focuses on five types of risk and opportunity events with defined likelihood and impact of each event relevant to strategic objectives. This element consists of ten dimensions as shown in Table IV.
3) *Define risk oversight responsibilities and corporate governance requirements:* this element of the framework suggests defining clear responsibilities for the leadership team toward their accountability for risk oversight. It also suggests defining specific requirements for the corporate governance. This element consists of ten dimensions as shown in Table V.

VI. Conclusion

This study uses quantitative methods, factor analysis in particular, to explore what factors do organizations need to consider when implementing ERM. Empirical evidence reveals that there are three factors, which were in turn operationalized by 37 dimensions that require specific considerations when implementing ERM. This study also suggests an ERM implementation framework to inform organizations on how to improve ERM implementation.

The main limitations of the study are related to identifying the right participants and collecting an adequate number of responses. The responses to the survey questions are self-reported where there is a possibility that some of the responses reported in this study do not accurately reflect the actual practice of ERM in an organization. The other limitation is finding an adequate number of participants who are willing to complete the questionnaire and share their organization's experience after ERM implementation.

It is suggested that the future research should explore the

relationship between identified factors and financial performance, which may yield valuable insights into ERM's capacity to increase the likelihood of achieving financial targets. The research questions may include elements such as whether are organizations that adopt ERM and have the highest levels of risk oversight and corporate governance are associated with improved financial performance.

APPENDIX

APPENDIX I: DIMENSIONS, MEAN, STANDARD DEVIATIONS, SKEWNESS, KURTOSIS AND COMMUNALITIES

Dim.	Mean	Std. Dev.	Skewness	Kurtosis	Communalities
D1	3.25	0.79	-1.09	1.20	0.66
D2	2.84	1.05	-0.46	-0.99	0.69
D3	3.22	0.71	-0.69	0.43	0.52
D4	3.44	0.73	-1.23	1.15	0.71
D5	2.92	0.82	-0.39	-0.38	0.66
D6	3.60	0.67	-1.63	2.14	0.77
D7	3.42	0.79	-1.40	1.59	0.78
D8	3.36	0.78	-1.11	0.79	0.56
D9	3.35	0.76	-1.10	0.92	0.62
D10	3.20	0.76	-0.76	0.41	0.85
D11	3.23	0.79	-0.92	0.56	0.66
D12	3.20	0.77	-0.89	0.73	0.72
D13	3.11	0.95	-0.87	-0.14	0.89
D14	3.29	0.78	-0.94	0.50	0.73
D15	2.66	0.93	-0.34	-0.68	0.67
D16	2.64	0.94	-0.24	-0.80	0.71
D17	3.14	1.00	-0.98	-0.11	0.70
D18	2.69	1.00	-0.33	-0.90	0.70
D19	2.53	1.13	-0.21	-1.37	0.57
D20	2.80	0.95	-0.44	-0.67	0.76
D21	3.01	0.97	-0.77	-0.32	0.81
D22	2.94	0.98	-0.71	-0.41	0.80
D23	2.85	0.98	-0.40	-0.87	0.70
D24	2.61	0.99	-0.28	-0.94	0.73
D25	2.51	1.18	-0.11	-1.50	0.34
D26	2.82	0.98	-0.49	-0.71	0.83
D27	2.93	1.10	-0.72	-0.80	0.80
D28	2.59	1.17	-0.23	-1.43	0.67
D29	3.05	1.04	-0.82	-0.54	0.47
D30	3.18	1.05	-1.07	-0.13	0.62
D31	2.97	1.10	-0.79	-0.70	0.67
D32	3.18	0.98	-1.10	0.23	0.58
D33	3.03	1.03	-0.77	-0.55	0.70
D34	3.64	0.67	-2.24	5.48	0.78
D35	3.45	0.74	-1.40	1.86	0.82
D36	3.35	0.77	-0.97	0.27	0.74
D37	3.25	0.78	-0.86	0.33	0.67
D38	3.41	0.77	-1.13	0.59	0.68
D39	3.34	0.77	-1.08	0.87	0.59
D40	3.42	0.82	-1.37	1.24	0.89
D41	3.33	0.82	-1.13	0.75	0.89
D42	3.28	0.88	-0.84	-0.51	0.84
D43	3.20	0.87	-0.69	-0.60	0.87
D44	3.19	0.92	-0.90	-0.12	0.63
			Mean of Communalities		0.70

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