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Abstract :

The research examines how the ERM frameworks have been adopted and how effective they are in implementing the goals of Saudi Arabia's Vision 2030 in the manufacturing and energy industries. The study employs mixed methods research that involved a survey of 50 companies from the Saudi Arabia's manufacturing and energy sectors, as well as a qualitative study involving interviews from 20 senior managers/risk officers. Findings show that while some firms had developed structured ERM practices, many either had no well-developed ERM frameworks or were in the process of building them. Key risks identified include economic validity, cybersecurity threats, and regulatory changes that are relevant threats to ERM implementation. The study identified a reasonably significant positive relationship ($r=0.648$) of ERM framework implementation with preparedness for disruptions, underscoring the importance of structuring ERM frameworks to promote resilience. Furthermore, the study acknowledges that Vision 2030's emphasis on local sourcing as well as digital transformation are important factors in driving strategic organizational changes, although the level of fit with these goals varies considerably between the companies. Many ERM frameworks are shown to enhance business resilience, with performances, indicating the requirement for enhanced flexibility, expandability, and real-time reporting to cope with existing conditions. The study concludes by outlining strategies to enhance the implementation of ERM, promote the use of technologies, risk management approaches, and orientations with Vision 2030 for supply chain sustainability and competitiveness.

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Chapter One

Introduction

Saudi Arabia for instance, their document known as Vision 2030 launched in the year 2016, has the noble task of seeing the Kingdom transition from a complete reliance on oil. This was a strategy that entailed provision of a strong comprehensive reliable and diversified economy with proper infrastructure and services. However, this journey to change is not without key challenges such as emerging issues on the risk of supply chain (Al Sulami et al., 2024).

Contemporary global economy is a competitive, global web of networks with many factors or forces that pose several risks or decision-making dilemmas to supply chains. Hazardous events include natural and human-caused disasters that affect businesses adversely, such as; natural disasters, geo-political events, and cyber risks. Supply chains require to be elastic, sustainable, and maintained through Enterprise Risk Management (ERM) to be able to cope with and address these challenges.

As Saudi Arabia is an oil-rich country that is involved in international supply chain networks and energy business, risk management on supply chain is important to the country. The present paper focuses on the ERM practices among businesses in Saudi Arabia, which they use to strengthen their supply chain and flexibility. Special attention will be paid to the manufacturing and energy industries because they are strategic for the country's Vision 2030 on economic diversification.

The goals are to collect data and to use literature review method, case studies, and interviews with supply chain specialists to gather practical insights. Consequently, the findings will facilitate organizations' understanding of the risks and prospects linked to ERM in supply chain operations. As a result of the findings, organizations will be able to better understand the challenges and opportunities associated with ERM implementation in supply chain management. The study will also propose a robust risk management plan and approach for the whole supply chain system as well.

The purpose of this research is also to fill the gap in risk management literature and in the overall development of risk management theory and practice by enhancing understanding of risk management in supply chain networks. That is why it is possible to anticipate, respond and recover supply chain disruption by identifying best practices. Therefore, different operations can be managed and goal attainment in the delivery of services to the customers can be achieved while the general performance of business can be boosted.

Problem of the Study

For many years, the Saudi economy has relied on oil income and more often, it has been exposed to falling oil prices in the international market. This risk has been factored into Vision 2030 since new non-oil-based products also have their own supply chain challenges and risks. Prior research suggests that extended traditional supply chain risk management (SCRM) miss the mark in handling all the of complex risks that Saudi Arabia encounters today including shifts in global trade, geopolitical risks, and economic uncertainties (Alshehri et al., 2022; Oke et al., 2023).

Studies have found that the implementation of sustainable supply chain management faces significant risks including economic, managerial policy, and environmental risks that need to be identified, evaluated, and prioritized (Alshehri et al., 2022). These risks range from those that relate to market dynamics, financial constraints, management policy failures, and credit uncertainty.

In recognition of these diverse risk factors that face SCRM, this research will add to the existing body of knowledge on the efficiency of ERM frameworks within the context of the current dynamic socio-economic context within Saudi Arabia. It will fill knowledge gaps about the way Saudi businesses practice ERM for risk management and organizational resilience with reference to Vision 2030 insights for policymakers and strategic business managers.

Significance of the Study

As part of this research, we address the gaps in enterprise risk management (ERM) practices within supply chain operations, which are of significant significance both for academia and industry. In addition to contributing to existing knowledge, this study provides practical insights that can contribute to organizations' success. The research has both scientific and practical importance as follows:

1. Scientific Importance:

- Contributes to improving the knowledge about the ERM practices in the given specific socio-economic and geopolitical environment.
- This research paper also enriches the risk management literature, especially in relation to nontraditional risks typical of Middle Eastern economies that are in the process of economic change.
- Offers an avenue for future studies, on the general supply chain risk and resilience in other similar transitional economies.

2. Practical Importance

- Helps Saudi Arabian industries to implement sound strategies that will mitigate risks that may affect their supply chain.
- Educates policy makers on weak linkages or openings as well as other compelling opportunities overlooked in current risk management and policy making to enhance Vision 2030.
- Provides applicable suggestions for supply chain management, to implement ERM frameworks for creating sustainable SCs to support Vision 2030 goals.

.Objectives of the study

The main objective of this study is: To examine the capability of ERM in strengthening supply chain resilience in Saudi Arabia and its relevance towards the accomplishment of Saudi Arabia Vision 2030. The sub-objectives include the following:

1. To develop an understanding about the significant risks that may threaten the prospects of SC resilience in the Kingdom of Saudi Arabia's changing economic sectors.
2. To critically assess diverse common practices currently employed in the management of these risks by firms.
3. To measure on the correspondence of the current ERM strategies to the economic transformation of Vision 2030.
4. To protect Saudi supply chain from future risks, this research aims at offering suggestions to improve ERM.

To address the above research objectives, this study will discuss the prospects and issues related to integration of enterprise resource planning and supply chain management. The related findings and recommendations will enable the development of more resilient supply chains and minimization of the organization and economic impacts of supply chain disruptions in Saudi Arabia. It will also bring more effective and efficient knowledge about enterprise risk management and supply chain management in satisfying future research and giving benefits to the practitioners about the true striking characteristics of supply chain risk management.

Research Questions

The main research question that informs this study is: How effective are Enterprise Risk Management strategies in building supply chain resilience in Saudi Arabia's Vision 2030 transition?

Various other sub-questions are explored in this study as follows:

- What are the primary risks impacting supply chain resilience in the Saudi economy?
- How do Saudi Arabian companies currently implement ERM frameworks to manage supply chain risks?
- Are existing ERM practices sufficient to support the socio-economic transformation targeted by Vision 2030?
- What improvements can be made to ERM strategies to enhance supply chain resilience in Saudi Arabia?

We will use these questions as a framework for investigating, analyzing, and recommending enterprise risk management best practices in supply chain operations while considering challenges, impacts, and best practices related to it.

Hypotheses of the Study

For this study's research hypotheses, the variables and relationships that will be investigated include Enterprise Risk Management (ERM) frameworks and supply chain resilience of Saudi Arabian companies within the context of the countries Vision 2030. Considering these variables as well as the study's research questions and objectives, the main hypothesis of the research is as follows:

1. **H1:** Effective implementation of Enterprise Risk Management (ERM) frameworks significantly improves supply chain resilience among companies in Saudi Arabia in alignment with Vision 2030.

Sub-Hypotheses:

2. **H1a:** Organizations that have implemented more developed ERM systems offer less interruption to their supply chain than organizations with a less developed or no ERM system.
3. **H1b:** Application of digital technologies (Internet of Things, blockchain, artificial intelligence) in the context of ERM leads to an increase in the effectiveness of supply chain risk management.
4. **H1c:** Organizations that integrate Vision 2030 goals in their ERM approach have better supply chain risk management levels than those companies which do not factor Vision 2030 in their ERM.

These hypotheses enable a coherent investigation of the effects of ERM on supply

chain vulnerability with the Saudi Arabian context and Vision 2030 at its focus. They give clear reference points to the objectives of the study and give directions for both qualitative and quantitative research.

Scientific Theory Used in Preparing the Research

The theoretical foundation of this research is grounded in **Enterprise Risk Management (ERM) theory** and **Contingency Theory**. These theories are most appropriate to study how organizations of the flexible Saudi Arabian energy and manufacturing industry approach ERM and manage risks in the context of Vision 2030 aims at the development of the non-oil sector.

1. Enterprise Risk Management (ERM) Theory

ERM theory underlines the organizational comprehensive and systematic approach to managing risks. Different from the conventional risk management whereby risks are addressed individually in various areas of the organization, ERM theory supports a strategic approach to risk management whereby risk is managed at the corporate level and risk responses developed are consistent with organizational goals (Jean-Jules & Vicente, 2021). In the frame of this study, ERM theory indicates the ways Saudi companies recognize, evaluate, and manage diverse risks – economic, operational, technological, and geopolitical, threatening strategic achievements. The study will also apply ERM theory to measure the capability of ERM frameworks across organizations and further judge the capabilities of such frameworks to foster long-run organizational resilience within an environment that is constantly changing. Of these claims, the theory's capability to direct risk management in comprehending strategic goals and objectives is crucial when applied to Saudi organizations that want to meet Vision 2030 mandate.

2. Contingency Theory

This theory is also relevant to this research since contingency theory holds that the success of organizational practices including risk management is dependent on certain contingencies (Villoria, 2023). Such considerations include the size/scale of the organization, nature of business and technological novelty, compliance to regulatory demands/standards, and the extent to which the organization is synchronized with the national strategic frameworks such as Vision 2030. In other words, therefore, ERM cannot be a conforming activity everywhere as the basic needs, environments, and challenges faced by each organization are different. In deploying contingency theory, this study explores how many Saudi companies adapt ERM strategies sui generis their industrial issuant and environmental obstacles, determining which of these factors critically impact ERM efficacy and viability.

3. Institutional Theory and Environmental Influence

External legitimacy perspective is also used supplementary to this research, primarily within the context of institutional pressures—governmental regulations, industrial norms, and cultural requirements, et cetera, on ERM practices. For companies, the institutional driver of more sustainable and resilient risk management in Saudi Arabia can be found in Saudi Arabia's Vision 2030 initiative. Based on the institutional theory, institutions compel organizations to bring change in their internal operations to align with the requirements of the outside world (Peters, 2022). Thus, institutional theory will allow the study to examine

how Saudi national goals, regulations, as well as industry standards impact choices made by Saudi companies regarding risk management and achieving Vision 2030 objectives.

This research uses ERM theory, contingency theory, and elements of institutional theory to add a much stronger foundation to the research on how the Saudi companies manage risk in the environment that is constantly changing. These theories taken together enable an analysis of ERM practices strategic and with consideration of contextual factors by which lesson learnt are directly relevant to Saudi Arabia's business environment and Vision 2030 goals. Due to the nature of complexity of risk management, it is possible for two different theoretical lens to offer different but relevant insights to enrich the field of ERM and strategic management studies in emerging economies.

Chapter Two
Previous Studies

Introduction

ERM has attracted increased attention in the last two decades because organizations globally have increasingly realized the need for effective risk management to improve organizational resilience and promote organizational strategic goals (Beck & Devereux, 2008; Bromiley et al., 2015; Emrouznejad et al., 2023). ERM is not merely a risk management practice but goes beyond embracing all the risks in the organization up to corporate units and ensures that there is a harmonization of risk plans with the laid down organizational objectives. ERM has been significant in Saudi Arabia due to endeavors such as Vision 2030 that aims at the diversification of the economy and building up of essential industries such as power and production (Al Sulami et al., 2024). Whereas in the past these industries encountered relatively 'simple' risks like diminution of price levels, shifts in exchange rate, unfavorable political climate or system, technological breakthroughs or system, today's managers recognize that strong ERM frameworks are critical for maintaining sustainability and competitiveness in the face of growing 'compound' risks.

To that end, this literature review aims to review the current state of ERM in Saudi Arabia theoretical models as well as practical issues related to ERM and influential determinant factors for ERM practice and its effectiveness. Prior research has investigated the impacts of ERM on performance, resiliency, and business strategy with focus on risk classes including operations, financial and supply risks which are germane to Saudi ventures (Kroes & Garvin, 2007; Ritchie & Brindley, 2007). Moreover, this review explores the aspect of information sharing, regulatory standards, and new technologies in ERM practices and focuses on the studies in the Saudi context to capture the proper needs and goals associated with Vision 2030. As such, despite reviewing the literature, this paper acknowledges the gaps in knowledge on ERM's applicability to Saudi Arabian industry and establishes the foundation for the work to be done in this study by verifying the maturity and efficacy of ERM on Saudi companies.

Previous Studies:

Many studies have examined the association between ERM implementation and the supply chain and organizations and sectors. In one of these studies, Al Sulami et al. (2024), examines the importance of circular economy for the improvement of sustainability of supply chains within the Kingdom of Saudi Arabia in relation to the vision and objectives of the Saudi Vision 2030. Employing descriptive research technique, data was collected using questionnaires from a sample of 60 food factory owners; 30 new and 30 dry factory owners in different sectors of the food chain supply chain. The study objective was to evaluate the existing knowledge on circular economy activities and the issues encountered in their application by stakeholders. This study revealed that the integration of circular economy principles will go a long way to strengthen the sustainable supply chain management and provide a step-by-step approach to supporting environmental issues and resource management. This research emphasizes the need to adopt sustainable practices in supply chain management and focuses on how adopting the circular economy approach can help to reduce risks of resource scarcity and regulation in Saudi Arabia, providing important findings on ERM to the Saudi literature.

Additionally, Abusaq (2023), examines the moderating effect of information sharing quality on the relationship between supply chain management strategies and competitive advantage in Saudi Arabian manufacturing firms. Based on data collected from a sample of manufacturing enterprises the structural analysis by means of Structural Equation Modeling shows that competitive advantage depends on the key sources including the strong customer relationships, the high level of information sharing and selection of strategic suppliers. Surprisingly, the study results reveal that the information sharing quality has no direct significant impact on competitive advantage. Therefore, these research results suggest the need to develop strong customer relationships, efficient information flows, and supply network partnerships to achieve better competitive advantage on the market. This research enhances the supply chain management literature by giving insights pertaining to the industrial sector in Saudi Arabia and provides recommendations for managerial applications in the development of appropriate supply chain management strategies. The research also provides further research directions that identify additional variables, and investigate long-term impact of supply chain management on competitive advantage in the Saudi environment.

Emrouznejad et al. (2023) also carry out a similar study that aimed at presenting a comprehensive literature review of Supply Chain Risk (SCR). Using content analysis, the authors of this study have endeavored to discover the themes and trends of Supply Chain Risk Management (SCRM). First, it assesses the factors linked to risk identification, evaluation, and management approaches, second, it analyzes how emerging technologies influence SCRM. Introducing categorization frameworks to address the literature gaps and guide the research agenda of this emerging field, the study undertakes a systematic literature review. Some of the presented findings highlight the role of SCRM as a strategic business instrument for maintaining business operations and continuity, therefore such authors encourage increased focus toward risk management approaches among organizations. It also points to emerging research themes for future investigation such as

enhancement of creativity in constructing risk management frameworks and incorporation of new technologies in SCRM practices. Overall, by identifying the gap areas and uncharted territory, this research provides new findings to the understanding of SCR and methodological directions for future research in supply chain risk management.

A work by Oke et al. (2023), examines the risks relevant to construction sector in Saudi Arabia, which is one of the largest public construction markets in the Persian Gulf due largely to the strong government spending in social and economic infrastructure. The focus of this study is to establish the factors which lead to risks in construction process and to suggest the way of managing them. Thus, the work reveals that cost and time related risks are most common, and substantially hampered by changes in clients' requirements over the scope of work and kinds of orders. The risk profile of the sector has been provided qualitatively in this chapter and so the chapter provides an understanding on how such risks affect the delivery of projects and efficiency of the sector. It also presents new risk assessment instruments that are emerging in developed nations and proposes that they may be appropriate for Saudi Arabia. This research makes a significant contribution to knowledge of risk dynamics in the construction industry, particularly in Saudi Arabia and ERM frameworks' role in managing those risks to support project delivery success.

Alshahrani and Salam (2022) explore the impact of supply chain resilience on the small and medium enterprises (SMEs) in Saudi Arabia. The researchers in this study focus on three major dimensions of resilience, which include agility, robustness, and flexibility. The research employs a quantitative design, utilizing a self-administered questionnaire to collect data from 255 managers in SMEs across the region. The data analysis was conducted using SPSS/Amos 26 to test the hypothesized model. Key findings reveal that supply chain agility and flexibility significantly enhance both production and market/sales performance of SMEs, while robustness positively influences production performance alone. Overall, the study concludes that supply chain resilience as a construct has a significant positive relationship with SMEs' performance. This research contributes to the existing literature on supply chain resilience by providing insights into how these dimensions affect performance within the context of an emerging economy, thereby reinforcing the importance of resilience in managing operational uncertainties and enhancing firm performance.

Similarly, Alshehri et al. (2022) offers similar insights since his work aims at discussing the challenges facing the application of SSCM in Saudi Arabia manufacturing firms since the framework implementation is associated with multiple risks. In this study, the main aim is to find out these risks and assess the possibility of implementing possible countermeasures. The study employs an integrated multi-criteria decision analysis that consists of Fuzzy Analytical Hierarchical Process (AHP) and Fuzzy Weighted Aggregated Sum Product Assessment (WASPAS) techniques and established that economic risks are the most significant risks together with managerial policy and environmental risks. Of the sub-factors, industrial emissions dominated the list, followed by market factors and poor management policy measures. It is shown in this study that top and middle management commitment and support is a key to implementing SSCM practices. Other measures suggested include the development of credible environmental standards, plus assurance of right financial supports and subsidies. This study advances the knowledge regarding how these risk factors influence SSCM adoption in a developing economy context and

highlights the importance of tailored risk management interventions to promote sustainability in Saudi Arabian manufacturing supply chains.

Another related study is a study by Wang et al. (2022) which discusses the issues and apprehensions for SSC taking in consideration global disruptions including COVID-19, trade protectionism, geopolitics, and climate change among others. The main purpose of the paper is to present a systematic literature review of SSCRM, which can help supply chain practitioners use research results and theoretical models to build a more stable and competitive supply chain environment. The study adopts a quantitative and qualitative method to conduct a knowledge map of SSCRM using 793 retrieved articles. In scientometric and content analysis, the study points out the intellectual organization of the SSC risk management literature and presents a critical evaluation of motivations, strategies, approaches, and probes implicated to SSCRM. From these analyses, a conceptual model is developed encompassing three key aspects: risk identification, risk assessment, as well as risk mitigation and response. This research work presents recommendations for subsequent studies that would enhance the development of theoretical models and application of SSCRM. This work is useful for the creation of guidelines and resource libraries for risk management, thus providing insight to the discussion of risk management in sustainable supply chain management

Theoretical Framework

Definition of Risk

Risk can be defined as a possibility of a negative impact because of volatileness in the results. In case of supply chain, risks can occur in diverse forms and can range from minor to severe. For this study, we focus on three primary categories of risk:

1. **Economic Risks:** These are risks emanating from fluctuations in the financial and market areas such as exchange rates, inflation, and fluctuations in the global market. In Saudi Arabia, the economic risks are directly linked with balance of oil price because it causes changes in revenues and investment in different areas. Moreover, supply chains are subject to economic fluctuations – all being related to costs and demand.
2. **Operational Risks:** These risks are related to an organization's day-to-day operations and may include production interruptions or a delay in supply chain, as well as lack of labor or a problem with quality assurance. Operational risks are more significant to Saudi Arabia because different industries have begun diversifying their production portfolios with new technologies that need operational modifications and workforce development.
3. **Geopolitical Risks:** Since Saudi Arabia is in the Middle East region, geopolitical risks form a great part of the total risk. This include making cross-border investment, political instabilities, and conflicts which affect payment, trade barriers affecting the supply chain. Whenever there are issues of trade sanctions or changes in political relations with neighboring countries, there is likely to be a disruption in the supply of important commodities and/or disruption of the access to main supply routes, and this poses a genuine risk to supply chain stability (Rasshyvalov et al., 2024).

All these risk types are valuable in assessing the threats Saudi Arabian companies experience and emphasize the importance of efficient ERM strategies.

Types of Risks

Risks affecting Saudi Arabian supply chains can be broadly classified into two categories: External Risks and Internal Risks.

1. External Risks

- **Geopolitical Risks:** These risks include trade disruption, international sanctions or constraints on important trade corridors given Saudi Arabia's geo-political setting. Concerns in related areas may slow supplies or limit business opportunities for companies to penetrate the market.
- **Economic Risks:** These are associated with oil price change, inflation, and foreign exchange rates for matters of cost of production, sales revenue, and

qualitative change. The global economy consists of global consumption decrease, low consumer demand, and volatility create impacts throughout the supply chain.

- **Environmental Risks:** Extreme climate for instance floods or spoils consumer roads or ration, affect resources procurement and delivery. Environmental risks include in Saudi Arabia include the high temperatures which may affect the delivery of resources as well as workforce.

2. Internal Risks

- **Operational Risks:** These may be weaknesses such as inadequacies in production, problems in stock procurement and control, scarcity of labor or equipment breakdown. There are always uncertainties that may disrupt internal or external operations of an organization; thus, operations must be closely monitored to protect supply channels.
- **Technological Risks:** As Saudi Arabia opens the country and deploys more digital technology, then risks to data, cyber-attacks, and system crashes become quite major. Sudden system outages or cyber-attacks bring production line to a halt, slow operations, and recreate data.
- **Compliance Risks:** With changing regulatory requirements in line with Vision 2030, organization may find it hard to meet compliance, which may attract penalties or restrict operations. Maintenance of all processes to local and international standards is mandatory to maintain operation all the time.

Such classifications assist in identifying the weakness in the chains delivering products to Saudi Arabia to design proper risk management strategies.

Risk Management Steps

Organizations use the Enterprise Risk Management (ERM) system to easily manage risks in the organization since it avails an established pattern of risk identification, evaluation, reduction, and management. The following is a detailed description of each stage in the ERM process:

1. **Risk Identification:** The first level aims at identifying threats that may affect achievement of organizational goals. In Saudi Arabian supply chains, risk assessment mainly involves internal and external auditing where there is a possibility that sometimes several risks must be scanned for example political risks, economic risks or even manufacturing risks and technical risks. It is vital to track all such risks from an early stage to be able to intervene and respond properly.
2. **Risk Assessment:** The second step when developing risk management policies is to evaluate the identified risks including their probability of occurrence and consequences. Most of the time, it involves both, the qualitative and the quantitative risk assessment to categorize risks and ranking them by the degrees of danger and probability. For instance, supply chain decision makers may assess the risks of delay arising from geopolitical risks, and their related cost

implications to inform better prioritization in risk response planning.

3. **Risk Mitigation:** Mitigation is defined as risk management which entails identification of measures to minimizing the occurrence of risks or to lessen their effect. Possible measures could be finding other suppliers in order not to depend on foreign ones or increasing non-cybersecurity measures that would help avoid such shocks, or buying other types of technologies that would help forecast such occurrences. Companies may integrate these strategies with Vision 2030 objectives either by favoring domestic contractors or through increasing the rate of innovation to improve the level of robustness.
4. **Risk Monitoring:** There is need to constantly review the position to confirm that measures put in place to address identified risks are operational as planned. This includes monitoring key risk indicators (KRIs), analyzing new risks and adapt changes if needed. For instance, supply chain managers may monitor changes in the prices of oil, new emerging regulation changes that may call for disruption. A good methodology of monitoring guarantees that the organization can promptly deal with new risks in a bid to continue providing uninterrupted supply chain for its clients.

Through these steps, ERM frameworks offer a comprehensive approach to managing risks within Saudi Arabian supply chains, enabling organizations to address both immediate vulnerabilities and long-term sustainability goals.

Chapter Three

Methodology of the Study

Introduction

This chapter describes the research method and the approach taken for this study toward analyzing the ERM practices implemented in Saudi Arabian companies in the energy and manufacturing industries. Due to increased program risk and scope of objective of Saudi Arabia Vision 2030 a convergent mixed method research design integrated both quantitative and qualitative data. This allows for a two-pronged qualitative and quantitative analysis and therefore embraces both the risk probability profile and the actual roles and practice of risk management employees within these industries.

The characteristics of the Research methods, Research Community, and Scope of the Study are outlined in the next two subsections:

Methodology and Research Methods

This research will employ both qualitative and quantitative research approaches, thereby presenting a holistic view on the state of ERM amongst the Saudi Arabian organizations.

- **Qualitative:** The overall, quantitative part of research will consist of the interviews with the risk managers and the top managers of the organizations in the sectors relevant to Vision 2030 in manufacturing and energy. These interviews will major in discussion on participants' perception on ERM implementation, the concrete difficulties encountered and risk management approaches being practiced. As the interviews will be semi-structured, the respondents will be able to express opinions, insights, and detailed narratives regarding their organization's environment, ERM frameworks and how external factors such as regulatory changes or market fluctuations affect them. It will provide qualitative data which will then be analyzed to establish basic patterns that will define areas of concern and similarities in ERM in Saudi Arabia (Bowen, 2009; Bryman, 2016; Creswell & Creswell, 2017; Gliner et al., 2017; Yin, 2018).
- **Quantitative:** The quantitative part of the research entails the use of a structured questionnaire open to a more extensive population of organizations within the energy and manufacturing industries. This survey will seek to realize a quantitative measurement of the perceived efficiency of existing ERM practices in the organizations. The survey instrument will comprise a set of questions that aim at measuring several aspects in ERM, including identification, evaluation, and control measures. Applying quantitative research method, the study shall assess the significance of company type, industry, and the development of ERM frameworks on the effectiveness of risk management. The quantitative results of the study will supplement the qualitative data results, and enable a more nuanced consideration of the extent to which ERM is being practiced consistently with the Vision 2030 agenda (Bowen, 2009; Bryman, 2016; Creswell & Creswell, 2017; Gliner et al., 2017; Yin, 2018).

With this integration of qualitative and quantitative research approaches, the study will get a focused view of the contemporary situation with ERM in Saudi Arabia and develop an effective course of action for its enhancement and optimization for achieving the country's critical strategic goals.

Research Community

For this study, the population is formed by Saudi Arabian companies operating in the energy and manufacturing industries whose business activities are relevant to Vision 2030. These sectors are chosen because they are important for Saudi Arabian economy diversification processes and they are exposed to the risks of economic, operational, and geopolitical natures. In the targeted organisations, the study focuses on the senior risk managers, executives and other officials charge with ERM management and supervision. This group of professionals was used because they already have a specialized understanding of risk management processes which would offer a better and realistic view on ERM practices, issues, or consequences.

Scope of the Study

This work's subject matter sets the study's scope by analyzing ERM implementation, maturity, efficiency, and compatibility with Vision 2030 goals among the Saudi Arabian energy and manufacturing corporations. This research focuses on aspects of ERM, such as risk assessment, risk management and prevention measure, risk management culture and risk management in the context of corporate governance systems. In addition, the study also embraces both the external and internal risks that are appropriate in the Saudi context like geopolitical and operational risks and, the ways that regulatory framework and organizational culture influenced ERM. The period of the study restricts itself to the current state of ERM practices, with the aim of gaining insights from professionals currently in the field about how these frameworks are currently positioned to support organizational resilience in an ever changing economic and regulatory environment.

Such a defined scope guarantees that the outcomes obtained are immediately applicable to the Saudi Arabian economic environment and can be used by companies that aim to improve the risk management process in liaison with the overall national agenda.

Chapter four

Results and Recommendations

Introduction

In this section, the results derived from various surveys and interviews conducted with senior risk managers and executives of the energy and manufacturing industries of KSA are discussed. This paper offers valuable information on current ERM practices, effectiveness of the frameworks, the type of challenges the organizations experience in implementing robust ERM mechanisms for the achievement of Vision 2030.

The Data Results segment focuses on trends and most important conclusions regarding ERM maturity, priority types of risks, and the overall efficiency of the existing risk management approaches. These findings are presented to show where ERM frameworks fit in different organizations' governance systems, the level of risk consciousness within organizations, and how internal and external conditions shape ERM practices.

The Recommendations segment includes concrete recommendations stemmed from the analysis of the data. These recommendations are drawn to fill the perceived gaps and improve ERM in the context of Saudi Arabia. In this section, the report will emphasize the enhancement of ERM frameworks, development of a proactive risk culture, and integration of risk management with Vision 2030 to enhance its resilience and sustainability in conditions of the constantly evolving economic landscape. The conclusions of the paper as well as suggestion could provide a guideline for organizations that are interested in enhancing their risk management capabilities and better navigate the complex risk landscape facing Saudi Arabia's key industries.

Data Analysis

Quantitative Analysis (Survey Data)

A quantitative analysis of 50 companies randomly selected from Saudi Arabia's manufacturing and energy sectors revealed that 22% of the companies reported having formal ERM frameworks, 22% reported partial frameworks, 28% reported that their frameworks were under development, and 28% had no framework in place (Table 1).

1 Table ERM Framework Implementation

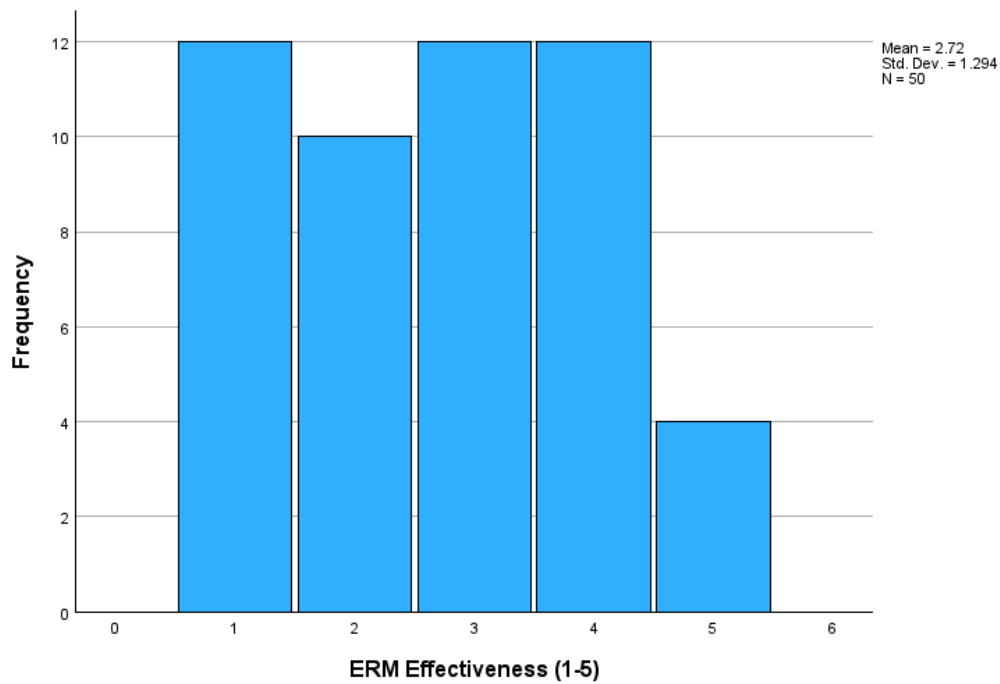
ERM Framework					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Fully implemented	11	22.0	22.0	22.0
	No framework	14	28.0	28.0	50.0
	Partially implemented	11	22.0	22.0	72.0
	Under development	14	28.0	28.0	100.0
	Total	50	100.0	100.0	

The top 3 challenges that most of these companies (38% of the respondents) reported include economic validity, cybersecurity threats, and regulatory changes (Table 2).

2 Table Top 3 Risks

Top 3 Risks					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Cybersecurity threats, Economic volatility, Supplier failure	11	22.0	22.0	22.0
	Economic volatility, Cybersecurity threats, Regulatory changes	19	38.0	38.0	60.0
	Geopolitical instability, Supplier failure, Cybersecurity threats	9	18.0	18.0	78.0
	Supplier failure, Economic volatility, Regulatory changes	11	22.0	22.0	100.0
	Total	50	100.0	100.0	

ERM Effectiveness and Supply Chain Risks



1 Figure Distribution of ERM Effectiveness Scores

The Figure 1 above, shows the distribution of Effectiveness (measured on a scale of 1 – 5 where 1 is Strongly ineffective and 5 is Strongly effective). This visual distribution of scores for ERM effectiveness shows that most responses are clustered around scores of 1 – 4, indicating a weak to a moderately high perceived effectiveness.

Impact of Vision 2030 on ERM Strategies

3 Table Impact of Vision 2030

Impact of Vision 2030					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Greatly impacted	13	26.0	26.0	26.0
	Moderately impacted	10	20.0	20.0	46.0
	No impact	16	32.0	32.0	78.0
	Slightly impacted	11	22.0	22.0	100.0
	Total	50	100.0	100.0	

Using responses on Vision 2030's impact, we find that most companies (26%) feel significantly or moderately impacted (20%) by this national agenda, aligning their strategies to prioritize local suppliers and digital transformation. However, a higher number of companies (32%) still feel that they have not been impacted by Vision 2030 (Table 3).

Correlation Analysis

We examined the correlation between ERM framework implementation and preparedness for disruption (measured on a scale of 1-5), finding a correlation coefficient of 0.648. This

correlation suggests a moderately strong positive relationship between ERM framework implementation and preparedness for disruption (1-5), an indication that as the implementation of an ERM framework improves, preparedness for disruption also tends to improve, though the correlation is not perfect (Table 4).

4 Table Correlations

Correlations			
		ERM Framework	Preparedness for Disruption (1-5)
ERM Framework	Pearson Correlation	1	-.066
	Sig. (2-tailed)		.648
	N	50	50
Preparedness for Disruption (1-5)	Pearson Correlation	-.066	1
	Sig. (2-tailed)	.648	
	N	50	50

Qualitative Analysis (Interview Data)

We also interviewed 20 senior managers and risk officers and used thematic coding to obtain the following results:

Table 5 Key Themes from Interviews

Theme	Description
Impact of Vision 2030	Local sourcing focus and reduced foreign dependency, aligning with national goals
Technological Integration	Emphasis on IoT and blockchain for transparency; a strong desire for predictive tools
ERM Effectiveness	Managers noted improved resilience with ERM but mentioned the need for greater flexibility
ERM Scalability Concerns	Concerns about adapting frameworks in highly volatile environments without real-time insights

Managers in these interviews observed that due to Saudi Arabia's Vision 2030, firms are encouraged to source locally and thus move away from reliance on imported products. Furthermore, the identified theme of technological integration during the survey was used by the managers to indicate the importance of IoT and blockchain technologies for further transparency and tracking with many managers admitting the need for better predictive tools. In regards to assessment of ERM effectiveness the interviewed managers recognize the positive impact of the approach on the increase of organizational resilience, pointing to the need for increased flexibility and real-time insight which is critical to the highly fluctuating environments.

The interview responses given by managers and risk officers toward Vision 2030 and ERM were positive, but scalability and adaptability of frameworks were broadly discussed.

Results:

ERM Framework Implementation

The quantitative analysis of survey data across 50 companies from Saudi Arabia's manufacturing and energy sectors offers insights into the current state of ERM framework adoption. The results indicate that:

- 22% of companies have formal ERM frameworks.
- 22% reported partial frameworks.
- 28% are in the process of developing frameworks.
- 28% have no ERM framework in place.

This distribution showed that while there is some formality applied to the ERM approach used in some organizations, a significant number of them might still not have a strong system for risk management in place. This gap shows a glaring need to enhance the adoption of well-defined ERM processes in these industries.

Key Risks and Challenges

An examination of the primary challenges faced by companies revealed three predominant concerns: economic validity, cybersecurity threats, and regulatory changes. These challenges were pointed out by 38% of the respondents as they view them as key hurdles to ERM implementation and its sustainability. The implications of these findings is outcomes that economic and regulatory risks, as well as the increasingly important aspect of cybersecurity, necessitate specific approaches to achieve effective ERM implementation.

ERM Effectiveness

The survey's effectiveness scores, ranging from 1 (Strongly Ineffective) to 5 (Strongly Effective), reveal that most companies rate their ERM effectiveness between 1 and 4. This distribution implies that nearly all the sample has a weak to moderately high perceived effectiveness, which reveals that some organizations enjoy some gains from ERM while others seem to find limitations in managing risks through their frameworks.

Vision 2030 Impact

The study also examined the perceived impact of Saudi Arabia's Vision 2030 on ERM strategies:

- 26% 26% of companies said it had a big effect where most of their business plans were oriented to Vision 2030 goals, local supplier development, and digital change.
- 20% reported moderate impact meaning that they have been able to adjust but are not quite in line with Vision 2030.
- Almost a third of the companies stated no disruption meaning that they are not aligned with Vision 2030 strategies.

From these findings, it can be inferred that although Vision 2030 is directing some firms into adopting an appropriate approach towards promoting local content sourcing and

integrating technology into business, a good number of firms are still off course in terms of national goals.

Correlation Analysis

The positive correlation ratio of 0.648 between ERM framework implementation and preparedness for disruption suggests a moderate enactment of ERM is positively correlated to the organization's preparedness for disruption. Importantly, a positive relationship between ERM structural development and reported organizational readiness for disruptions demonstrates that the presence of a strong ERM framework is beneficial for building company resilience.

Qualitative Analysis: Interview Insights

Thematic analysis of interviews with 20 senior managers and risk officers revealed several key themes:

- Impact of Vision 2030: Managers noted that there was a change of trend toward buying from within the country, which corresponds with Vision 2030 aims.
- Technological Integration: Concerning IoT and blockchain usefulness for transparency and predictability, many managers acknowledged the need more sophisticated technology.
- ERM Effectiveness: While we found that managers portrayed ERM frameworks as leading to greater resiliency, they also indicated that greater flexibility was an important aspect of these systems.
- ERM Scalability Concerns: There was concern on how it is possible to implement ERM framework in very volatile system with reiteration on the need for real time solution.

These findings are consistent with survey results, thereby strengthening arguments for both the flexibility of ERM frameworks and the advances in technology and Vision 2030 alignment.

Recommendations:

Based on the results, the following recommendations are proposed to enhance ERM effectiveness within Saudi Arabian companies:

1. Increase ERM Framework Development:

For 28% of the firms that still develop frameworks and 28% that report having no ERM framework, there is need to quicken the pace on ERM implementation. This could be brought about through workshops, training, and better resource allocation to enhance on preparedness in case of disruption.

2. Target Economic, Cybersecurity, and Regulatory Risks:

Due to the focus on economic, cybersecurity, and regulatory threats, companies have to design more specific plans, on financial risk management, cybersecurity measures, and staying updated on the regulations.

3. Enhance Technological Integration:

Various industry managers pointed to the role of IoT and blockchain systems in risk management. It is suggested that more investment should be made on these technologies for better transparency and traceability in supply chain. Other forms of risk identification that should be used include the use of predictive analytical tools.

4. Align with Vision 2030 Objectives:

For organizations that have not yet anchored to Vision 2030, key performance indicators should be formulated to achieve the developed goals. Such might include buying locally where possible, adopting technology and engaging local or domestic suppliers.

5. Improve ERM Scalability and Real-Time Insights:

Some industries experience high levels of volatility, and therefore: ERM frameworks must be flexible and easily modifiable. The proposed ideas regarding real-time data analytics and monitoring tools can further improve the firm's responsiveness and adaptability, and correspond to its requirements, as well as the increased level of change in the global context.

6. Continued Research and Monitoring:

It is suggested that studies of ERM practices should continue while risk profiles should be observed frequently to ensure that said frameworks adapt with

organizational changes. Rather than having a one time or annually integrated approach, companies should have a cyclic approach of ERM to improve it.

The above recommendations give a guide to improving the efficiency of ERM, boosting the readiness level, and promoting the compliance with Vision 2030 objectives, which enhances collectively the resilience and the competitiveness of Saudi Arabian manufacturing and energy- related enterprises.

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Appendices

Survey:

Survey Questionnaire (for Risk Management and Supply Chain Professionals)

Section 1: Demographic Information

1. What is your position within the company?
 - Supply Chain Manager
 - Risk Manager
 - Operations Manager
 - Other (please specify): _____
2. What is the size of your organization?
 - Small (1-50 employees)
 - Medium (51-200 employees)
 - Large (201+ employees)
3. How many years has your organization been operating in Saudi Arabia?
 - Less than 5 years
 - 5-10 years
 - 11-20 years
 - More than 20 years

Section 2: Enterprise Risk Management Implementation

4. Does your organization have an established ERM framework?
 - Yes, fully implemented
 - Partially implemented
 - No, but under development
 - No framework
5. What is the primary focus of your organization's ERM framework? (Select all that apply)
 - Financial risks
 - Operational risks
 - Geopolitical risks
 - Supply chain risks
 - Technological risks
 - Other (please specify): _____
6. On a scale of 1 to 5, how effective do you think your organization's ERM framework is in managing supply chain risks?
 - 1 - Very ineffective
 - 2 - Ineffective
 - 3 - Neutral
 - 4 - Effective
 - 5 - Very effective

Section 3: Supply Chain Resilience and Risk Management

7. What are the top three risks that your organization's supply chain faces? (Select up to three)
 - Supplier failure
-

- Geopolitical instability
- Economic volatility
- Cybersecurity threats
- Regulatory changes
- Other (please specify): _____

8. To what extent has Saudi Arabia's Vision 2030 impacted your company's approach to ERM and supply chain management?
- Greatly impacted
 - Moderately impacted
 - Slightly impacted
 - No impact
9. How frequently does your organization review and update its ERM strategy?
- Quarterly
 - Semi-annually
 - Annually
 - As needed
 - Rarely or never

Section 4: Risk Mitigation and Adaptation Strategies 10. What measures has your organization adopted to improve supply chain resilience? (Select all that apply) - ☐ Diversifying suppliers - ☐ Enhancing technology and digital systems - ☐ Increasing local production - ☐ Improving logistical and transport networks - ☐ Other (please specify): _____

11. On a scale of 1 to 5, how well-prepared do you think your organization is to handle a major supply chain disruption?
- 1 - Very unprepared
 - 2 - Unprepared
 - 3 - Neutral
 - 4 - Prepared
 - 5 - Very prepared
-

Interview:

Interview Questionnaire (for Senior Managers and Risk Officers)

1. Background on ERM Implementation

- Can you describe your role and how it relates to enterprise risk management and supply chain resilience within the company?
- How has the importance of risk management evolved within your organization over the past few years, especially in response to Vision 2030?

2. ERM Framework and Key Challenges

- What are the primary risks your organization faces within the supply chain, and how does your ERM framework address them?
- Could you share any specific examples of challenges your organization has faced in managing these risks?

3. Vision 2030 and Its Influence on Risk Management

- How has Saudi Arabia's Vision 2030 influenced your organization's risk management strategies, if at all?
- Are there any particular changes or adaptations your organization has made to align with the goals of Vision 2030?

4. ERM Effectiveness and Resilience Measures

- How effective do you think your current ERM framework is in managing and mitigating supply chain disruptions? What improvements could be made?
- What specific resilience measures (e.g., supplier diversification, local production) has your organization implemented to reduce dependency and strengthen supply chain resilience?

5. Technological Integration and Future Outlook

- How does your organization utilize technology to monitor and manage risks within the supply chain?
- In your view, what are the most critical steps your organization should take in the next few years to enhance supply chain resilience?

6. Concluding Questions

- If you could implement one change to your organization's ERM framework, what would it be, and why?
 - Do you have any additional thoughts on how companies in Saudi Arabia can better prepare for the supply chain challenges posed by Vision 2030?
-

Sample Responses (Printed from SPSS):

Untitled2

	Position	Company Size	Years Operating in Saudi Arabia	ERM Framework
1	Operations Manager	Medium	More than 20 years	1
2	Supply Chain Manager	Small	More than 20 years	3
3	Operations Manager	Medium	More than 20 years	3
4	Operations Manager	Small	11-20 years	2
5	Supply Chain Manager	Medium	11-20 years	2
6	Supply Chain Manager	Large	11-20 years	4
7	Operations Manager	Large	Less than 5 years	1
8	Risk Manager	Small	More than 20 years	3
9	Operations Manager	Large	11-20 years	3
10	Operations Manager	Large	11-20 years	4
11	Operations Manager	Medium	Less than 5 years	3
12	Operations Manager	Small	11-20 years	1
13	Supply Chain Manager	Medium	Less than 5 years	4
14	Operations Manager	Medium	5-10 years	1
15	Risk Manager	Medium	11-20 years	4
16	Supply Chain Manager	Medium	5-10 years	4
17	Risk Manager	Medium	Less than 5 years	2
18	Risk Manager	Medium	More than 20 years	1
19	Risk Manager	Medium	11-20 years	3
20	Risk Manager	Small	Less than 5 years	3
21	Supply Chain Manager	Large	More than 20 years	1
22	Supply Chain Manager	Medium	More than 20 years	3
23	Risk Manager	Medium	5-10 years	3
24	Risk Manager	Medium	Less than 5 years	1
25	Supply Chain Manager	Medium	More than 20 years	4
26	Supply Chain Manager	Medium	11-20 years	1
27	Supply Chain Manager	Medium	11-20 years	4
28	Operations Manager	Large	5-10 years	3
29	Operations Manager	Large	More than 20 years	3
30	Operations Manager	Medium	Less than 5 years	3
31	Risk Manager	Large	11-20 years	2
32	Operations Manager	Small	More than 20 years	4
33	Risk Manager	Medium	More than 20 years	2
34	Risk Manager	Small	5-10 years	2
35	Operations Manager	Small	11-20 years	1
36	Risk Manager	Medium	11-20 years	2
37	Operations Manager	Large	Less than 5 years	1
38	Operations Manager	Small	11-20 years	1

Abstract

The research examines how the ERM frameworks have been adopted and how effective they are in implementing the goals of Saudi Arabia's Vision 2030 in the manufacturing and energy industries. The study employs mixed methods research that involved a survey of 50 companies from the Saudi Arabia's manufacturing and energy sectors, as well as a qualitative study involving interviews from 20 senior managers/risk officers. Findings show that while some firms had developed structured ERM practices, many either had no well-developed ERM frameworks or were in the process of building them. Key risks identified include economic validity, cybersecurity threats, and regulatory changes that are relevant threats to ERM implementation. The study identified a reasonably significant positive relationship ($r=0.648$) of ERM framework implementation with preparedness for disruptions, underscoring the importance of structuring ERM frameworks to promote resilience. Furthermore, the study acknowledges that Vision 2030's emphasis on local sourcing as well as digital transformation are important factors in driving strategic organizational changes, although the level of fit with these goals varies considerably between the companies. Many ERM frameworks are shown to enhance business resilience, with performances, indicating the requirement for enhanced flexibility, expandability, and real-time reporting to cope with existing conditions. The study concludes by outlining strategies to enhance the implementation of ERM, promote the use of technologies, risk management approaches, and orientations with Vision 2030 for supply chain sustainability and competitiveness.

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**Evaluating Enterprise Risk Management Strategies for Supply Chain Resilience in Saudi Arabia
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