

**THE ROLES OF OPEN INNOVATION AS A
MODERATOR AND CORPORATE
SUSTAINABILITY AS A MEDIATOR IN THE
RELATIONSHIP BETWEEN RISK
MANAGEMENT FACTORS AND FINANCIAL
PERFORMANCE**

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by

AL ABBOODI ALI SHAKIR ZAIDAN

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In the name of God, the Most Gracious, the Most Merciful. And Say My Lord, increase my knowledge. Great truth of God. Oh God, you deserve praise and thanks for the greatness of our great Lord, the majesty of your authority, and the majesty of your position. Praise be to ALLAH. I would like to thank my main supervisor, Ts. Dr Khaw Khai Wah and my co-supervisor Dr. Chew Xinying. During the Doctor's tenure, they were not only the greatest supervisor, but they were also a perfect friend, supportive and endlessly inspiring. Without their guidance and support, this thesis would not have been conducted. I would like to thank Universiti Sains Malaysia and my prestigious School of Management which was my second family.

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LIST OF ABBREVIATIONS

CB-SEM	Covariance-Based Structural Equation Modeling
HTMT	Heterotrait–Monotrait Correlation Ratio
PLS-SEM	Partial Least Squares Structural Equation Modeling
SEM	Structural Equation Modeling
SPSS	Statistical Package for Social Science

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**PERANAN INOVASI TERBUKA SEBAGAI PENYEDERHANA DAN
KEMAMPAHAN KORPORAT SEBAGAI PENGANTARA DALAM
HUBUNGAN DI ANTARA FAKTOR PENGURUSAN RISIKO DAN
PRESTASI KEWANGAN**

ABSTRAK

Pengurusan krisis (mulai sekarang sebagai alat penting dalam organisasi) adalah berdasarkan gabungan amalan kemampuhan dan inovasi terbuka. Literatur mengenai pengurusan krisis mengesahkan bahawa penyiasatan strategi sedemikian selalunya terhad. Dengan syak wasangka bahawa faktor pengurusan risiko (kecenderungan krisis, pengambilan risiko, pengetahuan tentang krisis, membuat keputusan dan pengurusan krisis) aktif dalam prestasi kewangan. Banyak cabaran dan isu terbuka yang dihadapi oleh pencapaian pengurusan krisis masih belum diperhatikan. Kajian ini bertujuan untuk meneroka kesan faktor pengurusan risiko terhadap prestasi kewangan melalui pembolehubah pengantara, kemampuhan korporat. Di samping itu, kami meneroka kekuatan hubungan antara faktor pengurusan risiko dan kemampuhan korporat melalui interaksi inovasi terbuka. Untuk tujuan ini, kajian ini menambah literatur akademik dengan penyepaduan pemodelan persamaan struktur kuasa dua terkecil separa (PLS-SEM). Oleh itu, enam belas syarikat elektrik di Iraq menjadi sasaran. 549 soal selidik telah diedarkan dan 397 soal selidik adalah sah untuk analisis masa hadapan. Hasil kajian mendedahkan bahawa faktor pengurusan risiko mempengaruhi prestasi kewangan. Di samping itu, kemampuhan korporat memainkan peranan pengantara separa dalam hubungan antara faktor pengurusan risiko dan prestasi kewangan. Keputusan mengesahkan bahawa hubungan antara faktor pengurusan risiko dan kemampuhan korporat adalah

lebih kukuh apabila inovasi terbuka adalah tinggi. Selain itu, hasil kajian ini memberikan pandangan kepada ahli akademik dan pengamal untuk melaksanakan pengurusan krisis yang membawa kepada prestasi kewangan yang unggul.

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ABSTRACT

Crisis management is based on a combination of open innovation and corporate sustainability. The literature on crisis management confirms that investigation of such a strategy is often limited. With the uncertainty that risk management factors (crisis proneness, risk-taking, knowledge of the crisis, decision making and crisis management) are active in corporate sustainability and financial performance. Many challenges and open issues facing the achievement of crisis management have not been observed yet. This study aims to explore the impact of risk management factors on financial performance through the mediating variable, corporate sustainability. In addition, The study explores the strength of the relationship between risk management factors and corporate sustainability through the interaction of open innovation. To this end, this study supplements the academic literature with an integration of partial least squares structural equation modeling (PLS-SEM). Thus, sixteen electric companies in Iraq were targeted. 549 questionnaires were distributed and 397 questionnaires were valid for analysis. The results of the study revealed that risk management factors affect financial performance. In addition, corporate sustainability plays a partial mediating role in the relationship between risk management factors and financial performance. The results confirmed that the relationship between risk management factors and corporate sustainability was stronger when open innovation was high. Moreover, the results of

this study provide insights for academics and practitioners to implement crisis management that leads to superior financial performance.

CHAPTER 1

INTRODUCTION

This unit in brief summarizes the contents of Chapter 1. This chapter involves the study background, problem statement, research questions, research objective, scope of study, significance of study, the important terms and the organization of the final study. The next unit aims on the explanation of the study.

1.1 Background of the Study

Today, people hear more and more about how crises (economic, social, political, health, environmental, wars and energy) are affecting the world. Crisis are having a significant impact on the economy, which remains highly sensitive and reactive to any disruption. This issue has placed corporations in a very precarious position. It can affect sales, public perception of the company and its products, and employee motivation (Chedli, 2016; Gitelman & Kozhevnikov, 2022). As defined, a crisis occurs when a community's essential value or life-sustaining system is threatened. These values can include but are not limited to, security, safety, health, and financial.

A crisis is exemplified by the financial crisis in 2008, the ongoing COVID-19 pandemic and energy crisis (Borca et al., 2021; yang et al., 2021). A crisis is an unwanted event that can be caused by natural, technological, or human factors. A crisis is an occurrence that has broad negative implications and has the potential to affect entire communities or regions. A recovery period of crisis can be protracted and may require coordinated international efforts (Farazmand, 2018). A crisis is a rare, serious event that may cause damages to both the company and its stakeholders

and could put the company's existence at risk (Sheaffer & Brender-Ilan, 2014). Crises sweep across nations and marketplaces, threatening to engulf the lives of businesses, particularly those weakened by bad management and leadership (Jibai, 2018).

Environment is considered vital factor to achieve organization goal (Yasin et al., 2023). Organizations now run in a fast-paced environment. Their achievement and survival are mainly dependent on their ability to adapt to their environments. Organizations are exposed to a number of risks as the organizational environment changes (Elorz et al., 2015). The term crisis is an important element in all areas such as financial, economic, political and social, especially at the outbreak of the global financial crisis in 2008 and its repercussions and phenomena (Brill & Rakow, 2021). These are the unforeseeable and difficult to understand issues that force companies into crises. Due to external factors, the number of crises has risen dramatically in recent years. Hence, crises have become a vital element of organizational life (Civelek et al., 2016). The economy today faces many undesirable and unexpected crises and events, such as financial crises, natural disasters, and epidemics (Ponis & Natala, 2016). Furthermore, from the year 1929–1933 had an economic recession while from the year 2007–2008 had a financial crisis that caused the global economic and financial disasters (Hazaa et al., 2021).

Academic studies also indicate that crises are unpredictable and unimaginable. During times of crisis, a rise in organizational stress has a detrimental effect on the organizational environment. The main reason for organizational pressure during a crisis is that companies are forced to change their goals in accordance with the surrounding environment. Furthermore, depending on the severity of the crisis, organizational methods may need to be rethought (Parnell,

2015). A crisis is a watershed moment in the lives of people and populations when there is a break in continuity and uncertainty about the action of events. It is marked by a paroxysm of contradictions and uncertainties, which can result in violent outbursts or revolt. As a result, the crisis is caused by an imbalance (Chedli, 2016).

Crises are complex, dynamic and uncontrolled calamities that threaten the survival of the organization and provide a short response time. It is difficult to predict every emergency event by organization managers, so crises still threaten the survival of organizations is inevitable (Wang & Pitsis, 2020). A crisis is a situation in which institutions are exposed to the threats of the external environment and it costs them a lot of effort, time and money (Johansen, 2017). A crisis is being as an uncertainty event that leads to the sabotage of all regions and has all the possibilities that lead to the sabotage of all financial, material and human fields, including loss, death, and so on (Wut, 2019). Many organizations may lose control and effectively manage the crisis (Boin & Hart, 2007). A crisis is a hard, progressive process that does not always take place inside the constraints of a single boundary.

The term crisis has been interchangeably used with phrases such as disaster, business disruption, catastrophe, and emergency (Mikušová & Horváthová, 2019). In fact, a crisis leads to a state of systemic instability resulting from the accumulation of defects and weaknesses, and it must be seen as an event and a process. Furthermore, as mentioned previously there is needed to understand and manage the crisis to avoid ignoring the causes of crises and understanding how crises arise (Williams et al., 2017). The global financial crisis has wreaked havoc on developing and developed countries. For example, although emerging stock markets were not implicated in the mortgage crisis in the US, collapsed more than other stock markets. Due reducing capital inflows and affecting foreign direct investment and the economy in general

developing countries have always been fragile. In particular, making crisis response difficult. Unlike the United States and the Eurozone (Jomo, 2016).

There are several reasons behind the crisis. The causes of the crisis may be natural such as climate change, earthquakes or famine, and it may also have a human aspect related to human activity, and the crisis may have both external and internal origins. External factors include macroeconomic development patterns and plans, competition, global economic development, and the country's political condition. Internal issues are those that arise within the company (Balanovska, 2019). The financial and economic crisis is a clear model for confronting the environmental conditions that affected all sectors alike. Therefore led to a change in the idea of decision-makers in institutions to constantly change their decisions in order to survive and stand firm (Laskovaia et al., 2019). Companies face various environmental events such as financial crises, environmental uncertainty, fear of the unknown.

The economic repercussions of these events on institutions and organizations are various. Providing unique opportunities for management change or a precautionary measure that serves the interest of the company and reduces risk of such events occurring if prevented (Rikhardsson et al., 2021). Many companies consider the crisis an appropriate opportunity to change, expand and take advantage of the available opportunities, unlike some companies that consider the crisis an external threat or a threat that should be wary of (Wan & Yiu, 2009). Whereas the idea of crisis is treated as a danger in certain resources in the literature, it is examined in the context of the opportunity it presents for the organization in others. Organizations must be prepared for crises in order to minimize the potential for harm while simultaneously maximizing the opportunity. A crisis in an organization may be

described as a scenario that has the potential to result in significant organizational loss and where a decision must be made quickly (Mikušová, 2014).

As a result, having a distinguished organizational structure and a strong organizational culture is a requirement for being prepared for a crisis (Civelek et al., 2016). Within the context of crises, company failures, and volatile settings, there is an ongoing requirement for smart and effective management of the crisis. Crisis management is a relatively new topic of study that began in the late 1980s. It entails the tactical analysis and response to potential disturbances (Jibai, 2018). As a result, demand for competent crisis management skills and techniques have increased in order to secure the sustainability and survival of businesses (Klettner et al., 2014). The capacity of an organization's leaders to mitigate the severity of these crisis situations can have an effects. The crisis management actions of lower-level employess should not be ignored, boycotted and patiently accepted by leaders. The intensity of crises has a curvilinear connection with heterogeneity in this team (Crandall et al., 2013).

Crisis management and preparedness have evolved into the cornerstones of organizational resilience and viability in the face of disaster (Jibai, 2018). The process of crisis management is one of decision making. Its features are comparable to those of strategic management concepts since it is a unique type of management. Crisis management seeks to ensure that companies are prepared for crises while also taking the necessary steps to recover quickly and profitably (Cesta, et al., 2014). Over the past two decades, crisis management has seen the growth of a proactive approach to preventing or managing crises after the fact. The concept of proactive prevention is based on the concept that a crisis is unpredictable but not unexpected. These sensible organizations must recognize that crisis will strike at some time, but

firms have no idea when (Jaques, 2010). Many private and public institutions face a crisis at some point. Such unfavorable situations can require a significant amount of resources to manage. Some organizations already have the necessary resources in the form of a plan and formal of crisis preparedness.

Other organizations lack or have only a portion of these resources and should seek external assistance and support in the form of crisis counsel supplied by department experts, and crisis management teams (Johansen, 2017). With a stronger top management commitment to crisis management and sufficient resources, elite enterprises may theoretically be able to implement a more comprehensive and integrated crisis management portfolio, regardless of their financial clout (Yim & Park, 2021). Businesses across all industries confront stiff competition in today's economy. Many businesses' competitiveness is deteriorating as a result of the exacerbation of current crisis conditions in their operations and the development of new ones. All while living conditions and financial results deteriorate, and external influences, both positive and negative, have a significant impact on the actions of businesses operating in a dynamic environment. Thus, early implementation of crisis management can support companies create the necessary conditions to ensure competitiveness and financial stability (Balanovska et al., 2019).

Crisis management in the event of a potential crisis, the process consists of actions such as evaluating crisis indicators, taking appropriate measures, and recovering from the crisis with little damage. The crisis management process includes estimating and avoiding crises, defining their characteristics, preparing recovery and learning methods, rescheduling, and implementation (Liu & Christensen, 2022). According to Alpaslan & Mitroff (2021), crisis management is a series of related evaluations and audits that an organization performs in order to

mitigate crises that constitute a serious threat to the principal product service production process, personnel, the environment, and society.

Crisis management is a strategic planning approach that mitigates the risk and uncertainty associated with a catastrophic incident. This type of careful planning enables an organization to get a stronger sense of control over its business's sustainability (Fearn, 2016). Crisis management is a process that entails identifying and interpreting crisis signals, adopting, and implementing required steps to ensure a crisis is resolved with little damage. Identifying early warning signs of a crisis enables businesses to avert its occurrence and to survive without suffering catastrophic financial losses (Sahin et al., 2015). Operational crisis management includes both individual and collective efforts to improve demand, output, sales and revenue (Vesić, 2015).

Thus, crisis management efforts aimed at preventing business crises and increasing the firm's ability to cope with crises are critical. One of the essential preconditions for obtaining a high degree of crisis preparation inside a business is the presence of an organizational culture that values crisis management (Sumić & Labaš, 2019). Crisis management is such scholarly literature as adopting drastic measures for survival. Economists view crisis management as efforts designed for an organization to overcome a circumstance in which the performance of the organization is presented, with the organization remaining as the primary objective (Jankelová et al., 2018). Crisis management is a collection of elements intended to mitigate the effects of crises and minimize the real harm caused by a crisis (Coombs & Laufer, 2018). Crisis management is a highly empirical activity that is dependent on an organization capacity to cope with the unexpected and to combine many types of information in order to make the best choice and take the best action. The three

major objectives of relevant and efficient crisis management are to identify the response, to implement the response, and to keep in mind that the crisis may change or that the crisis response may not have the desired outcomes (Bénaben, 2016).

Such problems include a wrong perception of managing reality and implementing a wrong vision, creating an illusion of perfection in the organization. The risky marketing strategy, internal conflicts and production defects, inadequate governance, innovation, investment policy, and sometimes insufficient operational procedures and habits cause the crisis. The human component ranks first among the causes of internal crises (Khandiy, 2012). For today's companies, crisis management has become critical. The goal of crisis management is to improve an organization's ability to respond flexibly and swiftly to various types of crises. The purpose of organizational crisis management when operating under extreme conditions is to make timely decisions based on the best knowledge and explicit reasons (Pearson, 2018). Organizational crises are rare occurrences that might threaten an organization's sustainability while also providing chances for learning (Aljuhmani & Emeagwali, 2017). Effective crisis management requires managers, decision-makers, engaged organizations, and stakeholders to participate in certain phases and activities. With the emergence of multi-level crises, an increasing number of organizations are required to coordinate and interact in numerous areas, typically across several levels of government (Persson et al., 2017).

The emergence of financial crises in recent years that affected all sectors, not only the financial sector. Other sectors (industry, energy, oil, agriculture, trade and investment) are affected by crisis as happened in the mortgage crisis and the accompanying serious problems for the global economy causing financial losses (Ksantini & Boujelbène, 2014). Proper crisis management will assist organizations in

capitalizing on their strengths and utilizing them to their advantage during times of crisis, along with compensating for their deficiencies in order to mitigate the crisis's negative impact on their business (Borca et al., 2021).

The financial crisis affected the macro economies of all countries of the world, including developing countries such as Iraq. Hence, Iraq's domestic product, exchange rates, exports, inflation and unemployment have affected. Iraq was one of the most advanced and prosperous countries in all economic and social fields compared to Arab, Asian and even foreign countries. Iraq advanced in agriculture, industry, export and oil at that time, but wars, economic sanctions and the impact of the financial crisis led to a complete deterioration in the country's general economy (Ahmed et al., 2020). Iraq is now highly dependent on the oil sector in terms of revenue and income, and the budget accounts for 97.7 of its revenues. Therefore, Iraq is the seventh biggest producer and oil exporter with total exports of 6.1 million barrels per day and ranks 43rd among the largest oil exporters (Economic Cooperation Organization, 2019). The exchange rate of the Iraq dinar against the US dollar began to rise by 0.31 from 1983 to 2002, it fluctuated slightly, and the GDP increased continuously but below the usual level, besides inflation rose by 0.18% until it began to decline in 2017 (World Bank, 2019).

Today's business organizations face numerous obstacles, the most significant of which is the expanding number of service companies and the increasing intensity of rivalry amongst them. To resolve these problems, the majority of administrative leaders in service businesses have opted to prioritize crisis management tactics and customer service excellence. Electricity is one of the most significant productive sectors for services in any country, and it also serves as a critical pillar of global trade in the modern economic system. The advancement of this sector reflects a

portion of the complexity and commercial and economic development experienced by societies worldwide (Butt et al., 2021).

There is a financial crisis in the Ministry of Electricity, despite the existence of energy production and that electric energy is sold to consumers. But the presence of some problems that cause crises in the electricity sector, including the price of energy consumption is inappropriate with the cost of real production and the lack of collection of sums from citizens for the consumed energy and the existence of energy waste during the transportation process. And people's energy consumption is not rationalized, which creates pressure on the energy system which creates pressure on the energy system (Tabaqchali, 2017). This leads to pushing the Ministry of Electricity from relying on the state's general budget and requesting short loans to fill operational and investment expenditures. Which causes the financial deficit due to the companies inability to manage the crisis properly and crowding out resources for other related programs.

The burden on the state's general budget increases, which is expected to increase the deficit in 2025, a near-total deficit (World Bank, 2020; Iraq World Bank, 2021). On the other hand, the outputs of the electricity distribution directorates, whether public or private, have deteriorated and their inability to compete at the public and private levels in certain regions. On the other hand, it results from the administrative leadership's lack of reliance on specific solutions when confronted with crises, followed by a lack of value offered to the customer, resulting in a drop in the value of energy services (Saadia et al., 2017). Iraq's loss from the uncontrolled burning of natural gas, despite its necessary needs in producing electricity instead of importing natural gas from neighboring countries and not properly exploiting it, is estimated at 632 billion cubic feet. It is the second-largest natural gas reserve after

Russia. This is due to the existence of an actual crisis. It may be an institutional or administrative crisis that leads to a stifling financial crisis that disrupts the development of the energy and infrastructure sector (Iraq Economic Monitor, 2021).

1.2 Public Companies of the Iraq Ministry of Electricity

Electricity crisis is an important topic that has been extensively debated throughout history. Access to electricity is vital for enhancing people's living conditions and fostering economic and social development. Numerous fundamental human requirements are satisfied by electricity, particularly, light, fire, and mechanical strength (yang et al., 2021). Iraq is located in the Middle East and covers an area of 437,072 square kilometres. Iraq has a population of 40 million people. The country's climate is hot and arid, with subtropical influences. Summer temperatures are typically above 40 degrees Celsius on average and approach 50 degrees Celsius during the day in July and August. During the winter, the average daytime temperature is around 15 degrees Celsius and dips below zero on occasion. Recent years have shown an increase in the use of electricity for heating and cooling. Iraq's electricity condition has deteriorated significantly since the bombardment of power installations during Gulf Wars I and II.

Electricity is a critical area that contributes significantly to the development of economic to several nations that have experienced wars such as Iraq, Syria and Yemen. Implementation of Iraq power plant projects one critical factor in improving the experience of electricity power is that it has been operating at a deficit for decades due to a variety of financial, political, security, economic, and military considerations. Energy is critical for a nation's economic growth, wealth, and well-being. Electricity plays a critical part in any economy as an enabler of all other

sectors. Adequate energy supply is critical for economic growth and a variety of critical businesses. This is due to the state ideology that supports energy sector through the implementation of development economic projects that benefit and advance the Iraq citizen. Many factors affect electricity generation in Iraq, including economic and financial conditions, load growth, planning and wars. The majority of Iraq's current stations were constructed between 1955 and 1986.

Many were damaged during the 1991 Gulf War and were not adequately rehabilitated or maintained as a result of a absence of additional parts and a skills deficit imposed by economic sanctions for more than a decade after the war, with the exception of a limited minor gas stations that operated in 2003 (Nadhum & Erzaij, 2020). Approximately 90% of Iraq's power generation and distribution systems were damaged during the 1991 Gulf War, and full recovery has never occurred. Iraq was able to rebuild approximately 50% of its generation capacity following the war, which was sufficient until the mid-1990s. International sanctions in the subsequent years resulted in a significant scarcity of power generation capacity combined with weak economic development, resulting in a lack of electricity power for commercial, industrial, and domestic usage (Rashid, 2012). Due to the bad management, isolation from western countries and the lack of money, Iraq's oil and electric industry has suffered from severe underinvestment since nationalization in 1975. Quite badly damaged during the war. As a result of the Gulf War in 1991, international sanctions (1990-2003) and the 2003 invasion by the United States, the country's infrastructure was almost destroyed.

It was almost impossible to reconstruct Iraq without oil. Iraq's oil income constituted 92.23% of the government's total revenues in 2012, and expected to reach 93.11% in 2013. The oil and gas industry is the leading industrial user of power. It

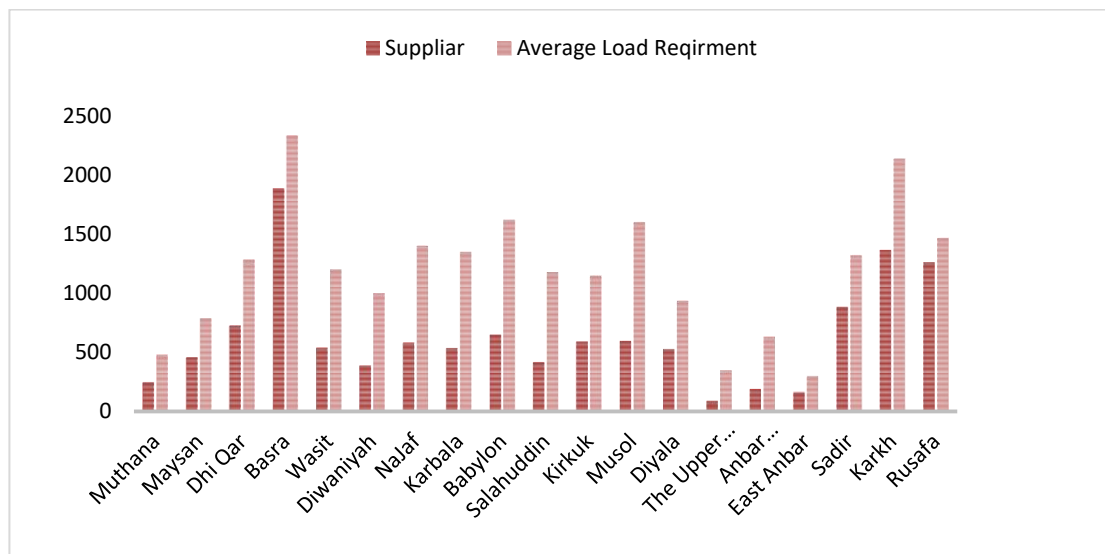
will also demand larger increases in the production of oil and electricity. Power outages are widespread in Iraq, therefore the country has not been able to keep up with the demand for power. In order to provide more power, the electrical industry will require substantial advancements. Without the need for any outside investment, rebuilding Iraq and its energy industry besides meeting the country's lofty output ambitions could not be overemphasized (Hanna et al., 2014).

Iraq faced two crises in the second half of 2014, one because of the drop in oil prices and the other because of ISIS. Oil prices fell from about \$112 in June 2014 to \$97 in September, \$62 in December, and thereafter to \$33 a barrel. Given Iraq's strong dependence on oil as a percentage of GDP, exports, and government revenues, any slight decrease in prices would be devastating because Iraq relies on oil revenues to finance all projects and public services such as electricity and others. A significant drop in oil prices is expected to disrupt the entire economy across economic sectors and regions, including the energy industry, which relies on government funding for current expenditures and oil is one of them one of the main generators of electricity. As for ISIS's occupation of most of the regions of Iraq, which took control of the oil fields and power stations and sabotaged many of the infrastructures in them (Krishnan & Olivieri, 2014).

Prior to the war, power production in 2003 was approximately 3,409 megawatts, with a demand of 4,653 megawatts. Following the war, the electrical energy situation continued to deteriorate as a result of corruption, sabotage, vandalism, and military actions. In 2004, generation was roughly 3,827 megawatts; by 2008, it had increased to 4,526 megawatts, a 63 percent increase. Demand, on the other hand, increased significantly, from 5,442 megawatts in 2004 to 10,000 megawatts in 2008 (Iraq Ministry of Planning, 2010). Power demand is increasing at

a faster rate than electricity generation, to the point where the country's energy needs cannot yet be met. In 2017, electricity demand totalled nearly 19,000 MW, while generated by all Iraq national power plants and imported energy totalled almost 15,000 megawatts MW.

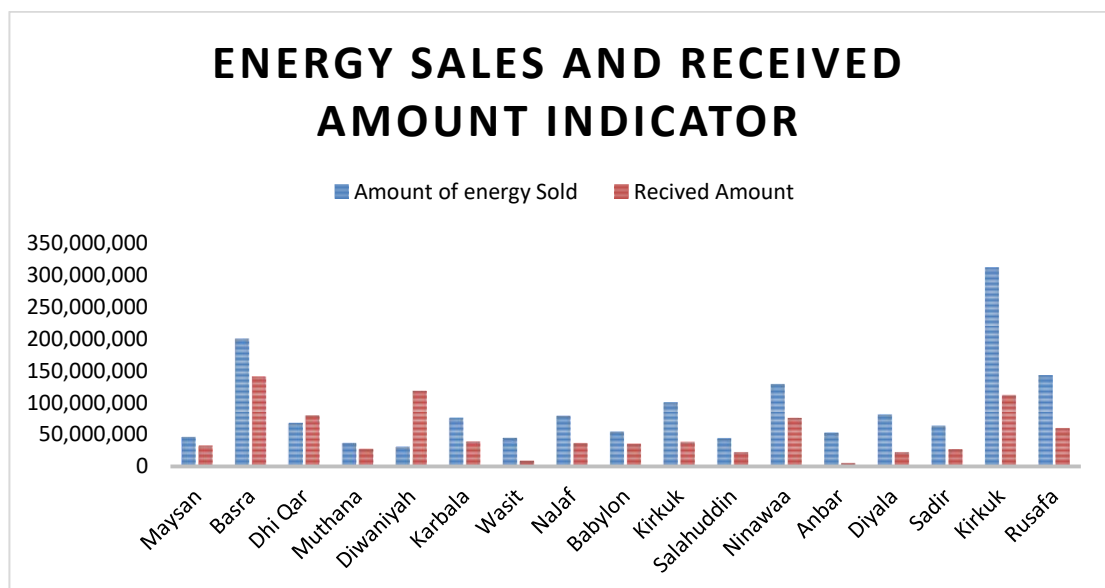
Iraq's government should take swift decisions and develop a plan to address the country's recurring electricity issue by reducing its risk and reliance on conventional energy sources and increasing its reliance on renewable energy (Hamdan et al., 2019). According to the report of the Iraq Ministry of Electricity in 2018, the actual produced energy from all power stations in the country is 13,002 megawatts, while the amount of demand for electricity by consumers is 22530 megawatts, and this demand increases by 10% annually. The Iraq government is trying to fill a small part of the electricity deficit, by importing energy from neighboring countries, which is 534 megawatts, or by purchasing energy from investment stations, which is 2024 megawatts. Which means that the demand for electrical energy is more than the supply by 48% during the crisis.



(Ministry of electricity in Iraq, 2018)

Figure 1.1 Required and supplied power

Electricity companies in Iraq are beset by a series of concurrent and compounding issues, rendering it incapable of generating sufficient income to sustain itself or improve consumer services. Years of neglect have resulted in a decaying grid infrastructure with low operating efficiency and high levels of loss, with over 50% of electricity generated being lost in transmission and distribution and another 20% wasted due to inefficient revenue collection. Actual power paid is less than 30% of production, but only covers roughly 10% of the cost of production due to non-cost-reflective prices. The electricity companies in Iraq is reliant on direct budgetary support, implicit fuel subsidies, and guarantees from the government to finance capital projects and operating expenses. Weak collection of electric energy revenues consumed by citizens and the commercial, industrial and governmental sectors that consume electric energy from the national system at a rate of 50% of the sold energy as in the table below (Iraq Economic Monitor, 2018 and ministry of Iraq electricity, 2018).



(Ministry of electricity in Iraq, 2018)

Figure 1.2 Energy sales and received amount

Between 2004 and 2012, electricity companies in Iraq spent almost \$41.5 billion on oil-related projects including \$17 billion on renovating existing power plants and installing new plants. While Iraq individuals spent roughly US\$80 billion on energy produced by private generators, the total investment required for Iraq's electricity sector is estimated to be around US\$26 billion until 2016 and an additional US\$54 billion until 2030 (Istepanian, 2014). Electricity tariffs are low. Iraq is one of the countries in the world with the lowest electricity prices.

Tariff rates for customer categories are now significantly subsidized, ranging from 0.85 to 4.50 US dollars per kWh (weighted average is \$1.85 US dollars per kWh). This is far from sufficient to cover expenditures and is roughly eight times less than the average residential electricity price in OEC countries. The cost-covering fee is around 11.30 US cents per kilowatt-hour (Hamadani, 2020). The electricity problem is characterized by population growth, insufficient resources, an increase in instances of corruption, and station and distribution network obsolescence. Electricity companies in Iraq are periodically confronted with successive crises, such as the fuel crisis and the financial crisis, which need the administration to plan and prepare in advance in order to overcome the crises and mitigate their impact to the greatest extent feasible. The complexity of sustainable power goals, methods, and plans within policies and national development strategies, and the inability of those strategies and programs to realize their integration of the energy sector and national development policies of the country. Inefficient energy production and consumption and a failure to establish clear strategic foundations for all national resources in order to address the looming electricity and water crises.

Unsustainable energy consumption patterns, in turn, result in the exhaustion and depletion of energy resources. Inadequate design of electricity and water tariff

structures in accordance with international norms, including placing the consumer at the centre of service provision and adhering to public service standards in the energy sector. Not utilizing solar energy or other modern renewable energy sources to generate electricity, and relying heavily on oil and gas derivatives for electricity and water generation (Al-Khafaji, 2018). According to a report issued by the Iraq Ministry of Electricity 2019 that the actual expenditure on electrical energy during 2019 is 8,950,560,427,185 Iraq dinars, which is equivalent to 71,604,483.41748 US dollars (Iraq Ministry of Electricity, 2019).

1.3 Problem Statement

Managers lack convenient policies to maintain and improve financial performance during times of crisis (Petitjean, 2019). Financial decisions and sustainability enhance competitive advantage and financial performance (Zhang al., 2019). Accordingly, organizations must overcome risk management factors (i.e. decision making, crisis proneness, and risk-taking), crisis management, and knowledge of crisis by improving the characteristics of corporate sustainability and open innovation in companies (Sheaffer et al., 2011; Zaidan et al., 2022; Sandhawalia & Dalcher, 2011; Dahlander & Wallin, 2020; Chiu et al., 2014; Brabham 2013). The latest statistics from the Ministry of Electricity in Iraq show an additional decrease in energy production and an increase in demand for power due to the decrease in the financial performance of companies. Oil, natural gas, electricity, and coal have experienced rapid price increases. These affect the financial performance of businesses, limit their profitability, and have a significant impact on daily operations. This situation is extremely challenging for businesses and frequently prevents them from accurately predicting the extent to which the energy

crisis will influence their organizations' performance (Al Essa et al., 2023; Ali & Alomar, (2023). Hence, the unfortunate results of electricity companies not using renewable energy or any other alternative that may mitigate crisis effects and enhance financial performance (Report of the Ministry of Electricity 2021).

The companies that work under the Ministry of Electricity provide an important contribution to economic development through job creation, poverty reduction, technological advancement, innovation, and sustainability (Chaichan & Kazem, 2018; Report of the Ministry of Electricity 2021). Electricity generation depends mainly on basic cycle technology in addition to the burning of heavy gas and fuel oil, indicating an unwillingness to make correct decisions and a fear of taking risks in its operations to keep up with the development of electric power (Khaw et al., 2023; Zaidan et al., 2022). Hence, Iraq has one of the highest rates of sunrise in the world, making solar energy a viable option. In addition, numerous parts of Iraq have tremendous wind energy potential.

The electricity companies in Iraq are considered vital to continued economic growth and stability. Thus, sufficient resources are essential for the sustainable growth and performance of electricity companies in Iraq (Kazem & Chaichan, 2012; Istepanian, 2014). Corporate sustainability improves the capability of companies to increase the financial performance (Saeed et al., 2016; Magon et al., 2018). However, the lack of sustainability activities is one of the major reasons for the weak financial performance of companies (Altai et al., 2022; Alshehhi et al., 2018; Annunziata et al., 2018). According to a recent study, more than half of newly established corporations failed owing to an inefficiencies, lack of resources, sustainability, inadequate skills, and innovation activities (Naji et al., 2019; Anwar & Ali Shah, 2018). According to the World Bank (2019), corporate sustainability is a

major obstacle to corporate growth in emerging markets and developing countries. At the same time, companies have struggled in order to overcome many obstacles to survival, growth, and sustainability (Gelhard and Von Delft, 2016).

Furthermore, risk-taking, crisis management and decision making that may improve the financial performance of electricity companies in Iraq are among such obstacles (Hashim et al., 2020; Maksoud et al., 2015). Companies are used open innovation to adapt internal processes to operate efficiently, effectively, and environmental demands and increase financial performance, particularly in times of crisis, uncertainty, and rapid market change (Azar & Ciabuschi, 2017). The Ministry of Electricity confirmed under the 2020 report that public companies unable to perform according to expectations due to some constraints related to government actions and open innovation. One of the most significant concerns contributing to the reduction in overall financial performance of firms is the failure to embrace open innovation (Zaidan et al., 2022; Kareem et al., 2019). A series of studies indicated the most significant problems that affect the performance of companies in Iraq include the lack of knowledge of the crisis, crisis management programs, excessive risk-taking and poor decision making, failure of firms to implement open innovation (Nadhum & Erzaij, 2020; Rashid, 2012). In theoretically, there is a narrow perception of the variables that influence the financial performance of public companies. Previous studies has focused on financial issues, but risk management factors (such as crisis proneness, risk-taking, and decision making) have received little attention in terms of their significance in improving financial performance (Israeli et al., 2011; McKinley et al., 2014).

Recent studies have addressed the issues of low production, increased demand for electricity, poor quality, and the poor performance of electricity

companies in Iraq (Abed et al., 2014; Haseeb et al., 2023). Due to the economic blockade, the war, and the arrival of military forces into Iraq between 2003 and 2014, the majority of the country's infrastructure and electrical stations, particularly those belonging to the Iraq Ministry of Electricity, collapsed (Report of the Ministry of Electricity 2020; Krishnan & Olivieri, 2014; Al-Khafaji, 2018).

The Iraq Ministry of Electricity aims to increase the production of electric power to 20 thousand megawatts in 2020. However, the actual need for energy is 30 thousand megawatts (Report of the Ministry of Electricity 2020). The gap between production and need in the Iraq public energy companies is due to the lack of funding for the establishment of more advanced plants. As mentioned previously, many crises have passed through Iraq, and the effect of such crises was the collapse of the infrastructure. Moreover, the problems of decline in financial performance persisted (Krishnan & Olivieri, 2014; Iraq Ministry of Planning, 2010). The results of the previous studies confirmed that sustainability leads to superior performance (Zhang et al., 2019; El-Khalil & Mezher, 2020). In this thought, the literature argues sustainability become a significant way to gain the high performance (Cantele & Zardini, 2018). Furthermore, Almeida et al. (2018) indicated that corporate sustainability encourage a firm's performance in a difficult time.

Sustainability is not just an environmental strategy; it also drives deep internal activities that greatly enhance a company financial performance. As a result, internal sustainability measures are frequently combined with competitive advantage, which considerably improves company performance in rising economies like Iraq (Vaio et al., 2018; Al-Wattar et al., 2019; Zaidan et al., 2022). There is a noticeable increase in the number of energy units produced, but this increase in production does not meet the local need. The problem is attributed to the failure to adopt corporate

sustainability and open innovation to address and anticipate adequate production of electrical energy (Report of the Ministry of Electricity 2021). Therefore, one of the problems of the electricity companies in Iraq are not anticipating the population increase and other problems (technical and organizational) to meet the actual need for energy in the future (Al-Khafaji, 2018). But these companies need to adopt more effective practices such as corporate sustainability and open innovation to provide more benefits to society, such as reducing costs, increasing production, reducing pollution, and improving their financial performance (World Bank 2019). Previous studies have confirmed that corporate sustainability and innovation is a critical factor to increase financial performance.

Thus, the electricity companies in Iraq remain suffering from a absence of open innovation. According to international reports 2018 and World Bank Report 2020, the innovation rate in research and development departments reached 10%. This percentage does not meet the ambition considering the great challenges facing the electricity companies in Iraq. In this context, electricity companies in Iraq suffer from the lack of concern for environmental, economic and social factors. Therefore, the lack of a contingency plan, security weakness and the spread of corruption will increase the issues that affect the sustainability of companies. The World Bank Report 2020 indicated that there is a high percentage of pollution from power plants because use traditional fuels instead of using renewable energy sources. The failure of these factors constitutes a weakness in the sustainability that would reduce financial performance of companies.

Previous studies indicate that the situation in electricity companies in Iraq are not stable. Therefore, need to use corporate sustainability and open innovation to increase financial performance, especially in an unstable environment, by reducing

pollution, increasing production, supporting innovation in production, distribution processes, and revenue collection (Azar & Ciabusch, 2017). To this end, this study complements the previous literature and ongoing research on financial performance, sustainability, and open innovation in various ways. The conceptual model of the current study is based on empirical evidence collected from Iraq's emerging market, which provides interesting theoretical and practical implications (Almeida & Melo, 2017). The mediating role of corporate sustainability affecting the relationship between risk management factors and financial performance was examined. Furthermore, this research attempts to clarify the ambiguity about the relationship between sustainability and financial performance (Grewatsch, & Kleindienst, 2017).

1.4 Research Questions

This study aims to provide answers to the following research questions based on the problem statement:

- 1) Does crisis proneness, knowledge of the crisis, risk-taking, crisis management, and decision making relate to the corporate sustainability in the electricity companies in Iraq?
- 2) Does corporate sustainability relate to the financial performance in the electricity companies in Iraq?
- 3) Does open innovation moderate the relationship between the crisis proneness, knowledge of the crisis, crisis management, risk-taking, decision making and corporate sustainability in the electricity companies in Iraq?
- 4) Does corporate sustainability mediate the relationship between the crisis proneness, knowledge of the crisis, risk-taking, crisis

management, and decision making with the financial performance in the electricity companies in Iraq?

1.5 Research Objectives

This study aims to examine the moderating role of open innovation and mediating role of corporate sustainability on the relationship between the characteristics of the crisis proneness, knowledge of the crisis, crisis management, risk-taking and decision making, and financial performance electricity companies in Iraq. The aim is suggested to be completed through the following objectives:

1. To examine the mediating role of corporate sustainability based on the relationship between crisis proneness, knowledge of the crisis, crisis management, decision making, risk-taking and financial performance in the electricity companies in Iraq.
2. To explore the moderating role of open innovation relating to the relationship between crisis proneness, knowledge of the crisis, crisis management, risk-taking, decision making and the corporate sustainability in the electricity companies in Iraq.
3. To investigate the relationship between crisis proneness, knowledge of the crisis, crisis management, risk-taking, decision making, and the corporate sustainability in the electricity companies in Iraq.
4. To investigate the relationship between corporate sustainability and the financial performance in the electricity companies in Iraq.

1.6 Significance of the Study

This study will extend a better perception of the effects of the crisis proneness, knowledge of the crisis, risk-taking, crisis management, and decision making on financial performance electricity companies in Iraq. In this regard, there are two main contributions of this study to bridge the gap of literature review by adopting the moderating role of open innovation and mediating role of corporate sustainability on the relationship between crisis proneness, knowledge of the crisis, crisis management, decision making, and risk-taking regarding financial performance in electricity companies in Iraq. Moreover, there are two main contributions to this study which are theoretical and practical perspective as follows:

1.6.1 Theoretical Perspective

In electric companies, the technical complexity of continuous process innovation reaches its peak (Woodward, 1965). Continuous process technology allows organizations to program the activity, anticipate the process, and regulate the technology, while major system interruption can still arise. The main problem controlling the increase in electrical power production, correcting mistakes, and reducing losses in such companies (Jones, 2013). As a result, these companies must develop a separate approach to attain high performance and efficiency while focusing on innovative, decision making, knowledge, and management (Daft & Marcic, 2016).

This study focuses on the electricity sector since, due to the severity of crises and hazards in this sector, Iraq relies largely on it to recover the economy. International reports indicate a major failure to implement effective and practical risk and crisis management (Al-Abrow et al., 2019). This study differs from others in