



A Framework for Climate Change Risk Management Practice and Performance of Financial Institutions in Saudi Arabia

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Abstract

Objective – Increasing intensity and severity of extreme weather events are threatening economic resilience and longer-term prosperity. Therefore, a framework for effective climate change risk management is required to manage the climatic challenges and preserve the long-term presence of financial institutions. The purpose of this paper is to design a conceptual framework for determining the level of climate change risk management (CCRM) practice, and understanding of CCRM. It also aims to identify CCRM valuation and analysis, and CCRM monitoring and regulating in financial institutions, particularly in Saudi Arabia's finance organizations. It further aims to investigate the relationship between CCRM practice and financial performance.

Design/methodology – The paper reviews and synthesises the relevant literature on climate change risks and management, and financial institutions. A conceptual framework for managing climate change risks is then developed and proposed in the paper.

Results – Using this conceptual paper as a starting point for empirical research, we will examine CCRM practices among financial institutions. It is hoped to fill a knowledge and method gap.

Research limitations/implications – The knowledge obtained from this study hopes to support the supervision of CCRM among the financial institutions and internal control system to meet the requirements of The Intergovernmental Panel on Climate Change to manage climate change risk in Saudi Arabia.

Novelty/originality – In this study, the originality lies in the fact that previous studies have only examined financial practices among financial institutions. Studies on climate change risk management practice have not yet been carried out.

Keywords: Climate change risk management, financial performance, financial institutions, saudi arabia

1. Introduction

In developing and developed countries around the world, research on the consequences of climate change on public health, agriculture, industries, man-made materials, and financial institutions has perceived a noteworthy boost in the last few decades. "Climate change represents an unprecedented and highly complex threat to long-term economic interests" (Denton & Perrella, 2021; Baglee, 2012). Therefore, climate risk is no longer a philosophical or hypothetical concern, but rather a basic commercial issue.

Unprecedented and highly complex weather conditions are getting worse, more frequent, and more severe (Denton & Perrella, 2021). The recent heatwaves, wildfires, and floods that have impacted many regions of the world are a preview of things to

come. Along with the natural environment on which we all rely, lives, means of subsistence, and even the social and economic stability of nations and regions are in jeopardy. Communities and populations that are marginalized, both within and between nations, are particularly vulnerable. The costs of past and present generations' insufficient climate action will fall on future generations (MCR, 2021; Eceiza et al., 2020).

Additionally, society is vulnerable to non-economic losses and damages brought on by extreme climate change. These include the effects that extreme and slow-onset catastrophes have on people's mental health, the destruction of cultural landmarks, biodiversity, and natural landscapes, and the loss of one's feeling of security and identity. Such irrational effects are difficult to quantify and hardly ever appear in socioeconomic evaluations. However, many people value some intangible features (such as family members' health and sense of safety) more than they do the consumption that comes with larger earnings. Developing countries (LDC) are excessively disturbed by the collisions of climate change. Their geographical position as well as their high degrees of exposure and sensitivity to climate hazards are to blame for this. For instance, a person in an LDC experiences the average relative change in high heat 50% faster than the typical person worldwide. (MCR, 2021).

AXA insurance company paid out over €1 billion in weather-related insurance claims worldwide in 2013. Meantime, a Brazilian drought that scorched Sao Paulo may have shaved 2 percentage points off the capital region's gross domestic product for the six months ended March 2015". Moreover, by 2030, between 30 and 130 million more people would live in extreme poverty because of rising temperatures and extreme weather. By 2050, temperature rise, sea level rise, cyclones, and high temperatures will cut GDP by about 1-3%. By 2050, ecosystems will have suffered non-economic losses of about 190 trillion dollars, and healthcare costs will have increased by 2-4 billion dollars year. Between 2030 and 2050, there will be an extra 250,000 fatalities annually. Impacts on mental health that are significant and disproportionately affect the most marginalized communities (MCR, 2021).

These uncertainties make it clear that action should be taken faster rather than later. High levels of climate change could endanger lives, livelihoods, and the advancement of development. A policy maker who is knowledgeable about the specifics of the risks and accompanying uncertainties is well-positioned to pinpoint effective and reliable courses of action to lessen and control them. When world leaders, decision-makers, entrepreneurs, and others get together for the COP26 international climate summit in late 2021, it will be evident that both problems and advancements have been made in the fight against climate change. Government commitments to achieve net zero carbon emissions are supported by initiatives to increase investment in green employment and technology, such as those under development in the US, China, and the EU, as well as the existence of nearly 2,350 climate legislation and regulations. Despite this, there are still concerns that not enough is being done to accomplish decarbonization, with current international pledges aiming to cut emissions by only 12% by 2030 rather than the 45% required to prevent global warming to 1.5°C or less.

As a result, business leaders across the board are becoming increasingly anxious about the sway of climate-associated hazards on their investments. Climate events that endanger assets, financial investments, and the valuation of organizations' creditworthiness and/or risk mitigation techniques are not immune from protection in the financial industry. As the backbone of any economy, the financial sectors need to give more attention to preventing loss of profitability and possible liquidation. A risk management agenda is a holistic approach for managers to identify risk and select appropriate responses to mitigate the climate risk in their institutions.

Literature has focused on financial risk management practices and the financial performance of the institution (Ali & Naysary, 2014; Ghani & Mahmood, 2015; Hudin & Hamid, 2014; Ariffin & Kassim, 2011). On the other hand, study of Barker et al., 2021;

Cooke., 2021; MCR, 2021 have proposed that risk-based approaches that incorporate future risks connected with climate change. However, there is a gap in the literature that examines the climate change risk management practices in financial institutions. Therefore, the current research tries to develop a model to investigate the relationship between Saudi Arabian financial industries' climate change risk management practices and financial performance. Thus, this study hopes to fill the knowledge gap. Moreover, this study would help to value add to the literature in the field of climate change risk management.

The structure of this paper is as follows; after the introduction, types of climate changes risks in financial organizations are discussed followed by the importance of climate change risk management on financial organizations. The paper then highlights the existing literature. The theoretical model and proposed framework are presented followed by the conclusions.

1.1 Types of Climate Change Risk in Financial Institutions

The complexity of climate impacts raises the possibility that a change in how financial risks are handled is necessary. For instance, national financial systems' resilience may under mounting pressure. Losses and damage to personal and commercial property can result in non-performing loans and a decline in the value of capital and collateral in the financial system, potentially raising the price of banking and insurance services. As a result, lending would decline and insurance premiums would rise. Due to potential variations in intensity, in their relationship to one another, and in their co-occurrence, which results in potential losses and damages, climate hazards in general might present challenges to current risk management systems.

The Prudential Regulation Authority (PRA) mentioned that financial institutions are exposed to risk in three ways such as; “1) Physical risks: the impacts today on insurance liabilities and the value of financial assets, which arise from climate and weather-related events, such as floods, wildfires, and hurricanes that damage property or disrupt trade. 2) Liability risks: the impacts that could arise tomorrow if parties who have suffered loss or damage from the effects of climate change seek compensation from those they hold responsible. Such claims could come decades in the future but have the potential to hit carbon extractors and emitters the hardest – and, if they have liability cover, their insurers. 3) Transition risks: the financial risks that could result from the process of adjustment towards a lower-carbon economy. Changes in policy, technology, and physical risks could prompt a reassessment of the value of a large range of assets as costs and opportunities become apparent”.

1.1.1 Physical risks

Damage to infrastructure and other assets, such as the agriculture sector, manufacturing, and supply chain operations, is linked to physical threats due to the occurrence and strength of dramatic weather changes (MCR, 2021). Financial institutions are exposed to longer-term risks from climate change, as well as possible near-term physical threats with more volatility (Denton & Perrella., 2021). Hauke et al. (2015) reported that in 2012, the major global food and agricultural company, Cargill, posted one of its poorest quarterly performances in two decades, largely due to the drought that afflicted the US. Such is an example of the devastation climate change can have on commerce. In a similar fashion. Western Digital Technologies recorded a significant drop in incomes in 2011 due to floods in Thailand where its manufacturing is situated. It resulted in a slump in global supply adversely affecting computer manufacturers.

A surge in tropical diseases is affecting many countries, including Thailand, Malaysia, Australia, and Japan, resulting in significant changes in both health requirements and healthcare funding, including private health insurance. Increased deaths from heatwaves will exacerbate this. Ocean temperatures are continuing to climb as the climate changes, affecting marine life. According to Paddam & Mackenzie (2016), the northern Great Barrier Reef is above 90% bleached, with 35% already dead in

Australia. Australia is the most exposed to natural disaster risks among the developed nations due to the increase in sea level. It makes the coastal property more vulnerable to storms, floods, and storm surges. The cost of insurance increases with the risk to become unaffordable forcing some to forfeit insurance. This can lead to drops in property values and defaults on mortgages. The risks associated with the climate are regarded as credit risk and threaten bank assets with the loss. It is a potential form of a financial crisis. The real estate industry is particularly exposed to climate threats such as cyclones and insurance premiums are increasing as a result (Paddam & Mackenzie, 2016).

1.1.2 Liability risks

Insurance firms may face liability risks from parties that have suffered losses because of climate change and are attempting to recover losses from those they believe are accountable. Liability insurance prevents the 'insured' from being held legally responsible for the loss or harm caused by the insured's conduct to third parties. Legal costs, as well as legal settlements, will be covered by the insurance up to a policy limit. Legal risks can take longer to assess than catastrophe claims since it takes time to determine whether the guarantor party is qualified and to determine the amount of the claim, which is frequently debatable and difficult to determine. Agreeing to PRA Returns Analysis (year-end 2014), property-related classes of insurance business accounts for 38% of the £78 billion of gross written premiums underwritten by the UK general insurance market in 2014. Insurance settlements are increased due to the consequence of world climate hazards.

1.1.3 Transition risks

To reduce the climate change effects, the “Intergovernmental Panel on Climate Change (IPCC)” has highlighted that the limit on the consumption of fossil fuels by 2015 is one-third if the world is to accomplish the ‘less than 2 °C’ goal. This policy would affect the value of assets and the productive chain of the carbon-intensive industries. Consequently, banks with exposure to these companies would face risks due to incorrect asset valuation, credit, and default. The asset management sector (pension fund) may also experience risks related to climate change and the transition to reduce carbon emission due to the changes in the public policy and regulations, new technology adoption, and shift in carbon pricing. In the meantime, insurance companies may face liability risks for not maintaining the IPCC regulations.

In this regard, some financial organizations seek to take climate risk into account in their business models (Watson & Sutcliffe., 2021; Baglee, 2012). In the next section, a brief discussion is provided about the importance of climate risk management practice for insurance companies, banks and asset management activities.

1.2 Importance of Climate Change Risk Management Practice on Financial Institutions

The top emerging risk for financial institutions is climate change (Watson & Sutcliffe.,2021). Increasing regulatory and economic pressure is being placed on banks to safeguard against the effects of climate change and to support the global sustainability agenda. Banking authorities plan to implement rigorous stress tests in the near future as they formalize new guidelines for managing climate risk. Eceiza et al. (2020).

With the increase in the rate of property damage is expected that insurance premiums will become underpriced by roughly 30%. The projected losses of the Association of British Insurers will reach 3.3 billion Euros by 2050 (Allianz Group and WWF, 2005).

Thrilling weather patterns may cause devastation in numerous parts of the world, providing a rising concern for banks that lend to businesses in those areas. With measures to reduce Green House Gas emissions, which create expenses for energy businesses, the banks'

loan portfolio in the fossil fuel sector will be susceptible to growing credit risks. This will also generate price instability in all climate-related supplies, as well as a great deal of uncertainty in a bank's financial forecasts. At this point, the financial industries are thinking about environmental risk and climate risk as a primary driver of portfolio credit risk and the banks need to build better tools for modelling climate change related to default risk (Barker et al., 2021). Cooke (2021) stated that "Currently, most of the drivers for change are non-litigious – it's more about government policy, shareholder and interest group pressures and access to investment. While underwriters in some business lines are really starting to focus on climate risks and issues, this will become more widespread, particularly if we start to see significant tangible losses."

Asset investors and asset fund managers are both curious about which assets are vulnerable to climate change because the increase in greenhouse emissions leads to a higher risk for their assets (Barker et al., 2021; Cooke., 2021; Allianz Group and WWF, 2005). However, the impact of climate change varies greatly depending on several factors, including the geographic location of the assets/investments, whether they are located in climate-vulnerable areas, the nature of the asset/investment, whether it is dependent on natural resources to operate, and the asset/duration. investment's Longer-term investments are thought to pose a significant risk of contributing to climate change. According to Miltner (2013), asset managers that manage a \$14 trillion portfolio have made 53 percent of their decisions to invest or deny based on climate change research. Moreover, 69 percent of asset owners confirmed the findings by reporting that their fund managers changed their judgments in response to climate change.

2. Literature Review

Uncertainty about the occurrence of a loss is characterized as risk (Rejda & McNamara, 2014). From the finance and statistics viewpoint, the risk is defined as the possibility of a deviation in cash flow from a projected cash flow or anything that prevents the achievement of goals. (Petty, Keown, Scott Jr., & Martin, 2004).

Risk must be managed by every business and every organization according to the size and nature of the operation for their survival in the long run (Barker et al., 2021). Risk management, on the other hand, is a process that identifies an organization's loss exposures and determines the most appropriate approaches for treating those exposures (Rejda & McNamara, 2014). Maintaining a risk management review process, an appropriate risk limit, an adequate risk measurement system, a thorough reporting system, and effective internal controls are all part of comprehensive risk management.

In many foreign jurisdictions, regulators have already started formalizing reporting requirements. The government of New Zealand was the first to mandate the disclosure of climate risk information based on the Climate-related Financial Disclosures (TCFD) framework for all NZX-listed equity and debt issuers, as well as all registered banks, insurers, credit unions, and asset managers with total assets exceeding \$1 billion. The European Union, Canada, Australia, and the United Kingdom are still working on completing their own mandatory standards for reporting climate risk. (Denton & Perrella, 2021).

As a result, risk-based approaches that incorporate future risks connected with climate change have been proposed (Barker et al., 2021; Cooke., 2021; MCR, 2021). The insurance industry is dedicated to risk management. Insurers are heavily impacted by quantitative risk estimations for natural and industrial disasters (Cooke., 2021; MCR, 2021). This is because insurance firms, particularly re-insurance companies, must strike a delicate balance between receiving revenue from premiums and incurring financial obligations in the aftermath of catastrophic catastrophes. Insurers try to set premium levels so that acceptable returns can be made over the long term because premiums are pooled before hazard events and outlays are transferred afterward. These quantitative estimates or projections of future hazard events are developed using actuarial approaches, which are at the cutting edge of quantitative risk assessment.

Literature has focused on risk management practices and the financial performance of the institution (Ali & Naysary, 2014; Ghani & Mahmood, 2014; Hudin & Hamid, 2014; Ariffin & Kassim, 2011). However, there is a gap in the literature that examines the climate change risk management practices in financial institutions. Since an increase in extreme climate change events causes financial suspicions, there is a prerequisite to study climate change risk management practices among financial institutions with the goal is to look into the threat of exposure and climate change management in institutions. The existing studies related to risk management practices include five constructs such as awareness of risk and its' management, risk identification, risk assessment, and analysis, and risk monitoring and control (Hassan, 2009; Peng, 2009; Rosman, 2009; Shafiq & Nasr, 2010).

3. Research Method

3.1 Variables and Measures

This study supports the existing literature to measure the level of CCRM practice and understanding of CCRM, CCRM identification, CCRM assessment and analysis, and CCRM monitoring and control in financial institutions. In model 1, CCRM practice is adapted as a dependent variable from past research (Sarabdeen., et al 2020, Ariff et al., 2014) and is modified to suit the respondents. Awareness of climate change risk (ACCR), climate change risk identification (CCRI), climate change risk valuation and analysis (CCRAA), climate change risk monitoring and regulating (CCRMC) are the independent variables. In model 2, the link between CCRM practice and financial performance is investigated. The independent variables in this model adapted from the literature are "return on equity", "return on investment", financial self-sufficiency, and "sales" or "market growth" (Tufano, 2011). The dependent variable will be measured using the following items. They are 1. "regular review of the performance in managing business risk", 2. "regular review of the institution's performance in managing climate change risk", 3. "effectiveness in continuous review/feedback on CCRM strategies and performance", 4. "documentation of CCRM procedures and processes and guiding staff about managing CCR", 5. "encouragement of the policy towards training programs in the CCRM", 6. "emphasizing the recruitment of highly qualified people having environmental related knowledge in effective CCRM", 7. "investing funds in one specific sector of the economy, implementation of the IPCC guidelines or principles concerning climate change risk", 8. "application of IPCC accord to improve efficiency and CCRMPs in financial institutions (FIs)".

3.2 Awareness of Risk and Risk Management

The first step of risk management practice is to be aware of the aspect of risk in the financial organization operations and the micro and macro environment of the institution. Al-Tamimi & Al-Mazrooei (2007) and Hassan (2009) have mentioned that awareness of risk and risk management is a crucial factor in risk management performance. Even the most advanced financial risk analysis frameworks, according to the Task Force on TCFD, do not take these and other climate hazards into account. Denton. & Perrella (2021).

This study will employ the following items to measure the level of awareness of climate change risk management in financial institutions; "common understanding of CCRM across financial institutions", "responsibility for CCRM", "accountability of CCRM", "the objective of financial institutions to expand the applications of the advanced CCRM technique", "continuous review and evaluation of the techniques used in CCRM", "the need to apply the most sophisticated techniques in CCRM", "application of CCRM techniques to reduce cost or expected losses and important", "performance and success of the financial institution".

3.3 Risk Identification

Risk identification is the process of detecting and classifying potential project risks, as well as documenting them. Financial institutions should start to comprehend their possible exposure, and they need to do to plan to analyze and report, and how they stack up against their peers in the relevant field (Denton. & Perrella., 2021).

The four methods of effective risk identification include sources of risk, hazard factors, perils, and risk exposure. (Tchankova, 2002). The following tools will be used in this study to assess the level of risk identification. They are 1. "The comprehensive and systematic identification relating to each of its declared aims and objectives". 2. "recognizing the changes in risk and identifying financial institutions' rules and responsibilities". 3. "the awareness of the strengths and weakness of the CCRM system of the other financial institutions". 4. "development and application of procedures of financial institution for the systematic identification of investment opportunities". 5. "concern of financial institution over climate change issues".

3.4 Risk Valuation and Analysis

Risk assessment and analysis is another important factor to ensure the balance between risks taken and the returns received by financial organizations. Financial organizations such as banks, insurance companies, and asset management funds need to have an appropriate, accurate, and flexible credit risk assessment and valuation system for developing a possible risk management environment for the institutions. The following tools will be given to the respondents to measure the level of climate change risk assessment and analysis; likelihood of occurring climate change risk, assessment using quantitative analysis methods, assessment using qualitative analysis methods (e.g. high, moderate, and low), assessment of the costs and benefits to address climate change risk, opportunities to achieve objectives, responses to analyze risk, and application of CC risk assessment and analysis.

3.5 Risk Monitoring and Regulating

Risk monitoring is an essential factor to ensure that risk management practices of organizations are corresponding to the institution's objectives (pre and post) and facilitate the financial institution to identify the shortcomings at their initial stage. The existing literature shows that bank risk monitoring has significant positive effects on the anticipated profit on firms' projects and thus enhances bank recital (Allen, Carletti and Marquez, 2008; and Besanko and Kanata, 1993). Eceiza et al. (2020) mentioned that to ensure climate risk governance, boards of financial institutions should inspect on exposures, retort quickly, and have thorough internal-reporting systems.

To measure the level of climate change risk monitoring and regulating, the following items can be used. "Monitoring the effectiveness of risk management", "appropriateness of the level of control for the risk that it faces, communicating processes to support the effective management of risks", "the effectiveness of the existing controls and risk management", "action plans in implementing decisions about identified risk", and "the existing control and monitoring process to consider climate change issues".

Based on the discussed above, five hypotheses have been developed as follows;

H1. There is a significant relationship between CC risk management practices and the level of awareness of risk management.

H2. There is a significant relationship between CC risk management practices and climate change risk identification.

H3. There is a significant relationship between CC risk management practices and climate change risk valuation and analysis.

H4. There is a significant relationship between CC risk management practices and climate change risk monitoring and control.

H5. There is a significant relationship between CC risk management practices and climate change risk monitoring and regulating the performance of financial institutions.

4. Results

4.1 Model Specification

$CCRMP = f(ACCRM, CCRI, CCRVA, CCRMR) \dots\dots\dots (Model 1)$

CCRMP = Climate change risk management practice
 ACCRM = Awareness of climate change risk
 CCRI = Climate change risk identification
 CCRVA = Climate change risk valuation and analysis
 CCRMR = Climate change risk monitoring and regulating

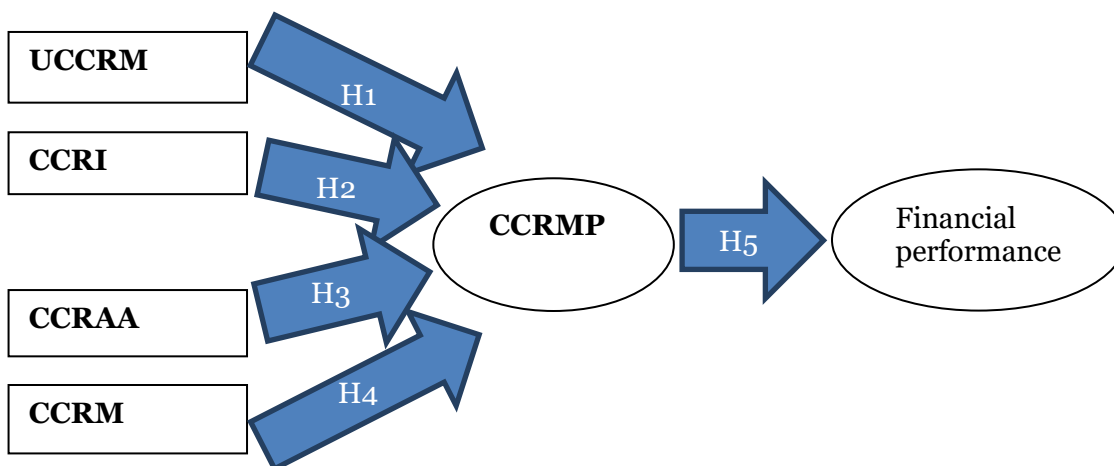
$CCRMP = f(ROE, ROI, FSS) \dots\dots\dots (Model 2)$

ROE = Return on equity,
 ROI = Return on investment,
 FSS = Financial self-sufficiency

4.2 Proposed CCRM Framework and Financial Performance

The framework of CCRM practices and financial performance among the financial institutions is illustrated in Figure 1.

Figure 1.
Relationship
between CCRM
practices and
financial
performance



5. Conclusion

Climate change is a system-wide problem that needs a system-wide response. The most effective way of managing risks is to work together. It's in everyone's interests to be part of the solution. When world leaders, decision-makers, entrepreneurs, and others get together for the COP26 international climate summit in late 2021, it is obvious that both problems and advancements have been made in the fight against climate change. Government commitments to achieve net zero carbon emissions are supported by initiatives to increase investment in green employment and technology. Despite nearly 2,350 pieces of climate legislation and regulations, there is still concern that enough is being done to accomplish decarbonization. In the current international climate agreement, emissions will be cut only by 12% by 2030, not the 45% needed to limit global warming to 1.5°C.

The current study proposes a framework of climate change risk management practices and financial performance among financial institutions as a strategy to mitigate climate change risk. Therefore, financial institutions must develop a comprehensive framework for managing CCRM innovatively to achieve their competitive goals. As such, this framework is expected to provide a CCRMP that will stimulate innovative ideas for meeting the climate challenges facing financial

institutions. We hope that future empirical findings using the developed conceptual model in this paper will contribute towards the practice of climate change risk management.

References

- Al-Tamimi, Hussein A. Hassan, & Al-Mazrooei, Faris Mohammed. (2007). Banks' risk management: a comparison study of UAE national and foreign banks. *The Journal of Risk Finance*, 8(4), 394-409.
- Ali. H. A & Naysary. B. (2014). Risk Management Practices in Islamic Banks in Kuwait. *Journal of Islamic Banking and Finance*, Vol. 2, No. 1, pp. 123-148.
- Allen, Franklin, Carletti, Elena, & Marquez, Robert. (2008). Credit market competition and capital regulation. Wharton Working Paper Series (No. RHS-06-037). <http://ssrn.com/abstract=813066> doi: <http://dx.doi.org/10.2139/ssrn.813066>.
- Allianz Group and WWF. (2005). Climate Change and the Financial Sector: AN Agenda for Action. Available at: http://www.wwf.org.uk/filelibrary/pdf/allianz_rep_0605.pdf.
- Ariff M. S., Ishak N., & Ismail K. (2014). A Framework for Risk Management Practices and Organizational Performance in Higher Education, *Society of interdisciplinary Business Research*, vol. 3(2).
- Ariffin NorainiMohd, & Salina Kassim., (2011). Risk management practices and financial performance of islamic banks: Malaysian evidence. Paper presented at the 8th International *Conference on Islamic Economics and Finance, Qatar*.
- Baglee, A., Haworth, A. and Anastasi, S. (2012). Climate Change Risk Assessment for the Business, Industry and Service Sector. *Department for Environment, Food and Rural Affairs*.
- Barker. S, Dellios. J, Mulholland, E. (2021). Liability risk and adaptation finance. MinterEllison. <https://www.unepfi.org/wordpress/wp-content/uploads/2021/04/UNEPFI-Climate-Change-Litigation-Report-Lowres.pdf>.
- Besanko, D., & Kanatas, G. (1993). Credit market equilibrium with bank monitoring and moral hazard. *The Review of Financial Studies*, 6 (1), 213-232.
- Cooke Laura (2021) Partner, Clyde & Co. Climate change risk and liability report 2021 <https://www.clydeco.com/en/reports/2021/10/climate-change-risk-and-liability-report-2021>.
- Denton.M.J & Perrella.J. (2021).How US Banks Are Addressing Climate Risk and Sustainability. Moody's Analytics. <file:///Users/masahina/Downloads/how-US-banks-are-addressing-climate-risk.pdf>
- Eceiza.J, Harreis.H, Härtl.D, and Viscardi. S. (2020). Risk Practice Banking imperatives for managing climate risk. Mckinsey & Company
- Ghani. R.A & Mahmood. R. (2015), Risk Management Practices and Performance of Micro financing Banks in Malaysia, *Academia Journal UiTMT*, Vol.4, Issue.2
- Hassan, Abul. (2009). Risk management practices of Islamic banks of Brunei Darussalam. *The Journal of Risk Finance*, 10(1), 23-37. doi: 10.1108/15265940910924472
- Hauke Engel, Per-Anders Enkvist, and Kimberly Henerson (2015), [How companies can adapt to climate change.](http://www.mckinsey.com/business-functions/sustainability-and-resource-productivity/our-insights/how-companies-can-adapt-to-climate-change) <http://www.mckinsey.com/business-functions/sustainability-and-resource-productivity/our-insights/how-companies-can-adapt-to-climate-change>
- <https://www.taylorfrancis.com/chapters/edit/10.4324/9781003037996-10/personal-financial-risk-management-practices-among-households-riyadh-saudi-arabia-masahina-sarabdeen-ann-largey-noreha-halid-muhammadu-kijas-abad-alzuman>
- Hudin. N. S &Hamid.A.B.A. (2014). Drivers to the Implementation of Risk Management Practices: A conceptual Framework, *Journal of Advanced Management Science*, Vol.2, No.3

- MCR (2021), Managing Climate Risks, Facing up to Losses and Damages Policy Highlights, https://read.oecd-ilibrary.org/view/?ref=1114_1114267-2s9d32f1xa&title=Managing-climate-risks-facing-up-to-losses-and-damages
- Miltner, S. (2013). Would you drive a motorcycle without a helmet?. Deutsche Bank Available at: <http://www.frankfurt-mainfinance.de/en/toolbox/news/news/11971/>
- Paddam, S & Mackenzie, K (2016) climate change impacts on Financial Institutions. *The Actuary, the of financial magazine of the Institute and Faculty of Actuaries*
- Peng, Xiaofei. (2009). An integrated risk management model for financial institutions. Paper presented at the *International Conference on Business Intelligence and Financial Engineering, Beijing, China*
- Petty, J. William, Keown, Arthur J., Scott Jr., David F., & Martin, John D. (2004). *Financial management: principles and application* (10th ed.). New Jersey: Pearson Prentice Hall
- Rejda, G. E., & McNamara, M. J. (2014). *Principles of risk management and insurance*, 12th ed, Pearson Education, Inc., New Jersey 07458, USA. [file:///C:/Users/D/Downloads/Principles%20of%20Risk%20Management%20and%20Insurance%20\(%20PDFDrive.com%20\).pdf](file:///C:/Users/D/Downloads/Principles%20of%20Risk%20Management%20and%20Insurance%20(%20PDFDrive.com%20).pdf)
- Rosman, Romzie. (2009). Risk management practices and risk management processes of Islamic banks: A Proposed Framework. *International Review of Business Research Papers*, 5(1), 242-254
- Sarabdeen, S, Largey, A, Halid, N., Kijas, A. C. M, and Abad, A. (2020). Personal Risk Management Practices among Households in Changing Socio-Economic Dynamics; a study in Riyadh, Saudi Arabia. Book Chapter, *Taylor & Francis Group*
- Shafiq, Afsheen, & Nasr, Mohamed. (2010). Risk management practices followed by the commercial banks in Pakistan. *International Review of Business Research Papers*, 6(2), 308 – 325
- Tchankova, Lubka. (2002). Risk identification – basic stage in risk management. *Environmental Management and Health*, 13(3), 290-297. doi: [dx.doi.org/10.1108/09566160210431088](https://doi.org/10.1108/09566160210431088)
- The Prudential Regulation Authority's (PRA) recent paper on The Impact of Climate Change on The UK Insurance Sector. http://www.bankofengland.co.uk/pru/Documents/supervision/activities/prade_fra0915.pdf
- Tufano, P. (2011), Managing Risk in Higher Education, *Forum Future*, pp. 54-58
- Watson, M, & Sutcliffe, B. (2021). Climate change and risk: 3 key challenges facing banks. [11th annual EY/IIF global bank risk management survey \(pdf\)](#)