

Reconceptualizing "Force Majeure" and "Change in Law" in the
Era of Climate Adaptation

Aurang Zaib Ashraf Shami

zaibjavaid@gmail.com

(PMP, MBA, LLM), Legal Advisor (Utilities & Infrastructure), Eastern Region, Saudi Arabia.

Sheikh Muhammad Ali

ali@rasikh.pk

MCI Arb, ASC, Managing Partner RASIKH Consilium, Lahore, Pakistan.

Muhammad Aftab

maftabnawaz@yahoo.com

Deputy Chief Financial Officer, Punjab Thermal Power (Private) Limited, Lahore, Pakistan.

Corresponding Author: Aurang Zaib Ashraf Shami zaibjavaid@gmail.com

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ABSTRACT

Climate change has fundamentally altered the risk landscape of infrastructure and commercial contracts, challenging the traditional interpretation of force majeure and change in law clauses. Increasingly frequent extreme weather events, evolving climate adaptation policies, carbon regulation, and environmental compliance measures have blurred the distinction between unforeseeable natural events and foreseeable regulatory interventions. This article critically examines whether conventional contractual doctrines remain adequate to allocate climate-related risks in modern legal and commercial practice. Adopting a qualitative doctrinal research methodology based exclusively on secondary sources, including legislation, judicial decisions, scholarly literature, and international legal instruments, the study evaluates the evolving legal treatment of climate-induced disruptions and regulatory changes. It argues that existing contractual frameworks require reconceptualization to reflect the realities of climate adaptation, emphasizing greater contractual flexibility, dynamic risk allocation, and resilience-oriented drafting. The study further proposes an integrated interpretative approach that harmonizes private contractual autonomy with emerging public law obligations arising from climate governance. By redefining the boundaries between force majeure and change in law, the article contributes to the development of climate-responsive contract law capable of enhancing legal certainty, commercial stability, and long-term infrastructure resilience in an era of accelerating environmental change.

Keywords: Force Majeure; Change in Law; Climate Adaptation; Contractual Risk Allocation; Climate-Responsive Contract Law

INTRODUCTION

Background of the Study

Climate change has emerged as one of the most transformative forces affecting legal systems, commercial transactions, and infrastructure development across the world. The increasing frequency and severity of floods, hurricanes, droughts, heatwaves, wildfires, sea-level rise, and other climate-induced events have significantly altered the operational environment of public and private projects. At the same time,

governments have introduced extensive climate adaptation and mitigation measures through environmental legislation, carbon pricing mechanisms, resilience standards, disaster management regulations, and sustainability policies. These developments have fundamentally changed the allocation of contractual risks, particularly in long-term infrastructure, energy, construction, transportation, and public-private partnership agreements. As a result, contractual mechanisms that were originally designed to address exceptional and unforeseen circumstances now face unprecedented challenges in responding to the complex realities of climate adaptation (Kim et al., 2025).

Among the most significant contractual doctrines affected by these developments are *force majeure* and *change in law*. Traditionally, force majeure clauses have been intended to excuse contractual performance when extraordinary events beyond the reasonable control of contracting parties render performance impossible or substantially impracticable. Such events typically include natural disasters, wars, pandemics, civil unrest, or other unforeseeable occurrences. In contrast, change in law clauses have been designed to allocate the financial and operational consequences arising from legislative, regulatory, or administrative changes that occur after the execution of a contract. These clauses seek to preserve contractual equilibrium by providing mechanisms for compensation, renegotiation, tariff adjustment, or risk redistribution when legal changes materially affect contractual obligations (Al-Marri, 2026).

The distinction between these two contractual doctrines has become increasingly uncertain in the context of climate adaptation. Climate-related events are no longer entirely unpredictable phenomena occurring in isolation. Scientific advancements, improved forecasting technologies, and decades of accumulated environmental data have increased awareness of climate risks, making many extreme weather events more foreseeable than in previous decades. Simultaneously, governments continue to strengthen climate adaptation frameworks by imposing stricter environmental obligations, resilience standards, emission reduction targets, and sustainability requirements. Consequently, climate-related disruptions often involve both physical events and regulatory responses, creating overlapping legal consequences that cannot easily be categorized under traditional contractual frameworks.

This evolving landscape has generated significant legal uncertainty regarding the interpretation and application of contractual risk allocation mechanisms. Parties frequently disagree on whether a climate-induced disruption constitutes a force majeure event, a consequence of regulatory change, or a combination of both. Such disputes become particularly significant in long-term contracts where project viability depends upon predictable allocation of financial and operational risks over several decades. Independent water projects, renewable energy facilities, transport infrastructure, industrial developments, and public-private partnerships are especially vulnerable because they require substantial capital investment and operate within continuously evolving environmental regulatory frameworks (BROKS, 2025).

The challenges posed by climate adaptation extend beyond contractual interpretation and directly influence broader principles of commercial law, investment protection, financial stability, and sustainable development. Investors increasingly demand contractual certainty regarding climate-related risks before committing long-term capital, while governments seek sufficient regulatory flexibility to implement evolving climate policies without generating excessive contractual disputes or compensation claims. Similarly, lenders and insurers have become increasingly attentive to the adequacy of contractual provisions governing climate risks, recognizing that poorly drafted clauses may expose projects to substantial financial losses, prolonged litigation, and operational disruptions.

The conventional understanding of force majeure and change in law developed within a legal environment where climate risks were relatively infrequent and environmental regulation evolved gradually. Contemporary climate governance, however, is characterized by dynamic legislative reforms, evolving international commitments, technological innovation, and growing public expectations regarding

environmental sustainability. These developments require contractual doctrines to evolve accordingly. Rather than treating force majeure and change in law as isolated legal concepts, modern contracts increasingly require integrated approaches that recognize the interaction between physical climate impacts and adaptive regulatory measures. Such reconceptualization supports greater contractual flexibility while preserving commercial certainty and equitable risk allocation among contracting parties (Broks, 2015).

Accordingly, this study examines the need to redefine these traditional contractual doctrines within the broader framework of climate adaptation. It explores whether existing legal principles adequately accommodate contemporary climate-related risks and considers how contractual drafting can be modernized to enhance resilience, reduce disputes, and facilitate sustainable infrastructure development in an era of accelerating environmental transformation (Figueroa, 2005).

Significance and Scope of the Study

The significance of this study lies in its examination of one of the most pressing contemporary issues in contract law: the adequacy of traditional contractual doctrines in addressing the legal consequences of climate adaptation. As climate-related physical risks and regulatory interventions continue to expand, parties engaged in long-term commercial agreements require contractual mechanisms capable of balancing commercial certainty with regulatory flexibility. This study contributes to the ongoing legal discourse by critically evaluating the conceptual boundaries between force majeure and change in law and by proposing a climate-responsive framework for contractual risk allocation. Its findings are expected to assist legislators, policymakers, judges, arbitrators, legal practitioners, project developers, financial institutions, and infrastructure investors in improving contractual drafting and dispute resolution practices. The study also supports the development of resilient commercial frameworks that facilitate sustainable investment while accommodating evolving environmental obligations (Khaled et al., 2025).

The scope of the study is confined to a qualitative doctrinal analysis based exclusively on secondary legal sources, including statutes, judicial decisions, academic literature, international legal principles, and standard contractual practices. It focuses on the interaction between force majeure and change in law clauses within the context of climate adaptation rather than climate mitigation generally. Particular attention is given to long-term infrastructure and commercial contracts where climate risks and regulatory developments have the greatest contractual significance. The study evaluates contemporary legal developments affecting contractual risk allocation without undertaking empirical surveys or jurisdiction-specific quantitative analysis. Instead, it provides a conceptual and comparative examination of evolving legal principles that can inform future contractual drafting and legal reform in response to climate change (Shami, Asghar, & Haider, 2025a).

Research Objectives

- i. To examine the traditional legal concepts of force majeure and change in law within contract law.
- ii. To evaluate the impact of climate adaptation measures on the interpretation and application of these contractual doctrines.
- iii. To identify the legal challenges arising from overlapping climate-related physical events and regulatory changes in long-term contracts.
- iv. To assess the adequacy of existing contractual risk allocation mechanisms in addressing climate-induced uncertainties.

- v. To propose a climate-responsive framework for reconceptualizing force majeure and change in law clauses in modern commercial and infrastructure contracts.

LITERATURE REVIEW

Conceptual Framework and Key Definitions

The growing influence of climate change on contractual relationships has reshaped the legal understanding of risk allocation in both public and private commercial agreements. Traditionally, contract law has relied upon carefully drafted provisions to distribute risks arising from uncertain future events, thereby promoting commercial certainty and minimizing disputes. Among these provisions, *force majeure* and *change in law* clauses have occupied central positions in managing unforeseen events and regulatory developments. However, the emergence of climate adaptation policies and increasingly frequent climate-related disruptions has challenged the conventional boundaries between these doctrines, requiring a broader conceptual framework capable of accommodating both physical and regulatory dimensions of climate risk (Asghar, Shami, & Kiran, 2025).

Force majeure generally refers to extraordinary events beyond the reasonable control of contracting parties that prevent or substantially hinder contractual performance. The doctrine is based upon the principle that parties should not bear liability for circumstances that could neither be anticipated nor prevented through reasonable diligence. Historically, force majeure has been associated with natural disasters, armed conflict, pandemics, civil unrest, and similar exceptional occurrences. Modern contracts frequently specify the events that qualify as force majeure while also outlining procedural requirements for notification, mitigation, suspension of obligations, and possible termination. Nevertheless, climate change has complicated this doctrine because many environmental events once regarded as exceptional are becoming increasingly predictable due to scientific advancements and historical climate data (Shami, Asghar, & Haider, 2025b).

In contrast, change in law clauses allocate risks arising from legislative, regulatory, judicial, or administrative actions occurring after contractual execution. These clauses preserve contractual equilibrium by allowing adjustments where new legal requirements increase project costs, alter operational obligations, or affect financial viability. In infrastructure projects, change in law provisions frequently provide mechanisms for tariff revision, compensation, renegotiation, or extension of contractual timelines. Unlike force majeure, which primarily addresses physical impossibility, change in law focuses upon governmental action and regulatory evolution. Climate adaptation legislation, however, increasingly creates situations where physical climate events trigger regulatory interventions, thereby blurring the distinction between natural events and legal responses (Sadozai et al., 2025).

Climate adaptation itself refers to legal, institutional, technological, and infrastructural measures adopted to reduce vulnerability to the adverse effects of climate change. Adaptation differs from climate mitigation because its primary objective is not reducing greenhouse gas emissions but strengthening resilience against unavoidable environmental impacts. Governments increasingly adopt adaptation strategies through revised building codes, environmental regulations, disaster preparedness legislation, land-use planning, water management reforms, and infrastructure resilience standards. These regulatory developments directly influence contractual performance by imposing additional obligations upon project developers, operators, and investors (Haider et al., 2025).

The conceptual relationship among force majeure, change in law, and climate adaptation demonstrates that modern contractual risks can no longer be viewed through isolated legal categories. Instead, contemporary contractual disputes often involve overlapping physical, regulatory, financial, and operational dimensions.

Consequently, an integrated conceptual framework recognizes climate-related disruptions as dynamic processes involving interactions between natural hazards, governmental responses, contractual obligations, and commercial expectations. Such an approach supports more adaptive contractual drafting while maintaining legal certainty and equitable allocation of emerging climate risks (Ahmad et al., 2025).

Theoretical Perspectives and Models

The legal evolution of force majeure and change in law can be understood through several theoretical perspectives explaining contractual risk allocation under changing social and environmental conditions. Classical contract theory remains one of the foundational approaches, emphasizing freedom of contract, party autonomy, and the sanctity of contractual obligations. Under this perspective, parties possess the autonomy to allocate foreseeable and unforeseeable risks through negotiated contractual provisions. Courts generally enforce these allocations unless exceptional circumstances justify legal intervention. Climate adaptation, however, places considerable pressure on this theory because environmental uncertainty continues to evolve long after contracts are concluded.

Relational contract theory offers a more flexible understanding of long-term contractual relationships. Rather than treating contracts as static exchanges completed upon execution, this perspective recognizes contracts as ongoing relationships requiring cooperation, trust, and continuous adaptation. Infrastructure projects, public-private partnerships, concession agreements, and energy contracts frequently extend over several decades, during which regulatory, technological, and environmental conditions inevitably change. Relational contracting therefore supports renegotiation, contractual adjustment, and collaborative risk-sharing in response to evolving climate-related challenges (Asghar, Shami, & Ashraf, 2025).

The theory of efficient risk allocation also provides significant insights into contractual responses to climate adaptation. According to this model, contractual risks should be allocated to the party best positioned to prevent, manage, insure against, or absorb particular risks at the lowest overall cost. Climate adaptation reinforces this approach because governments are generally better equipped to manage regulatory risks, whereas private developers often possess greater technical expertise in addressing operational climate resilience. Efficient allocation reduces transaction costs, minimizes disputes, and promotes sustainable investment by distributing risks according to institutional capacity rather than rigid contractual categories.

Resilience theory has emerged as an increasingly influential framework in environmental governance and infrastructure regulation. Unlike traditional legal models that emphasize stability and certainty, resilience theory focuses upon adaptability, flexibility, and the capacity of legal systems to respond effectively to evolving environmental conditions. Applied to contract law, resilience theory encourages dynamic contractual mechanisms capable of accommodating changing climate realities without undermining commercial certainty. It emphasizes contingency planning, adaptive governance, periodic contractual review, and flexible interpretation of contractual obligations (Khan et al., 2025).

Adaptive governance theory further strengthens this perspective by recognizing that effective legal regulation requires continuous learning, institutional cooperation, and responsive policymaking. Climate adaptation demands coordination among governments, private investors, regulators, insurers, and financial institutions. Consequently, contractual mechanisms should facilitate ongoing dialogue and adjustment rather than relying exclusively upon litigation after disputes arise. Together, these theoretical perspectives demonstrate that traditional contractual doctrines require reconceptualization to reflect increasingly interconnected environmental, legal, and commercial realities (Asghar, Javed, & Haider, 2025).

Review of National Literature

National legal scholarship increasingly recognizes that climate change presents substantial challenges for contract law, particularly within long-term infrastructure and public-sector agreements. Existing literature generally examines force majeure and change in law as distinct contractual mechanisms, emphasizing judicial interpretation, contractual drafting, and risk allocation. Scholars have observed that domestic courts traditionally interpret force majeure clauses narrowly, requiring parties to establish that qualifying events were genuinely beyond their control and rendered contractual performance impossible or substantially impracticable. This restrictive interpretation has promoted commercial certainty but may inadequately address the complex nature of recurring climate-related disruptions.

National studies further indicate that legislative reforms concerning environmental protection, disaster management, water conservation, energy transition, and urban resilience have significantly expanded governmental regulatory authority. These developments increase the frequency with which change in law clauses become relevant in infrastructure contracts. Domestic commentators argue that evolving regulatory frameworks frequently impose additional compliance obligations, increase project costs, and require operational modifications, thereby affecting contractual equilibrium and financial sustainability (Shami, Khaled, et al., 2025).

The literature also highlights the growing importance of climate resilience in infrastructure planning. Scholars emphasize that sectors such as energy, water, transportation, and construction increasingly incorporate environmental risk assessments into contractual negotiations. Nevertheless, many studies conclude that existing contractual templates continue to rely upon conventional force majeure definitions that insufficiently distinguish between foreseeable climate risks and genuinely exceptional events. Likewise, change in law provisions often fail to anticipate rapid legislative developments associated with climate adaptation.

Another recurring theme concerns dispute resolution. Domestic legal scholars note that overlapping claims involving climate events and regulatory interventions create uncertainty regarding contractual remedies, compensation mechanisms, and allocation of financial responsibility. While arbitration and judicial interpretation continue to evolve, commentators generally advocate clearer contractual drafting capable of addressing combined physical and regulatory climate risks. Overall, national literature acknowledges the growing significance of climate adaptation but remains largely focused upon individual contractual doctrines rather than their integrated reconceptualization (Azhar et al., 2025).

Review of International Literature

International scholarship has developed a far more comprehensive discussion concerning the interaction between climate adaptation and contractual risk allocation. Comparative legal studies demonstrate that jurisdictions increasingly recognize climate change as a structural challenge requiring contractual innovation rather than isolated legal interpretation. Researchers observe that extreme weather events, rising environmental standards, evolving climate policies, and international sustainability commitments have significantly altered commercial expectations across global infrastructure markets (Shami et al., 2025).

International literature extensively examines force majeure in light of increasing climate predictability. Earlier scholarship generally characterized natural disasters as unforeseeable events qualifying automatically for contractual relief. Contemporary researchers argue, however, that advances in climate science have reduced the unpredictability of many environmental hazards, requiring courts and arbitral tribunals to adopt more nuanced assessments of foreseeability, mitigation efforts, and reasonable risk

management. Consequently, force majeure increasingly depends upon contractual drafting rather than generalized assumptions regarding natural disasters.

Similarly, international scholars identify significant expansion in the use of change in law clauses to address evolving climate governance. Carbon pricing mechanisms, renewable energy policies, emissions regulation, biodiversity conservation measures, environmental permitting requirements, and resilience standards frequently alter project economics during long-term contractual relationships. Comparative analyses reveal that modern infrastructure agreements increasingly incorporate sophisticated compensation formulas, renegotiation procedures, hardship provisions, and risk-sharing mechanisms to preserve contractual balance under changing regulatory conditions (Shami et al., 2025).

International literature also emphasizes integrated contractual governance. Rather than treating force majeure and change in law as mutually exclusive doctrines, scholars advocate coordinated contractual frameworks recognizing interactions among physical climate events, governmental responses, insurance mechanisms, financial markets, and technological adaptation. Standard-form contracts increasingly include detailed climate risk provisions, mandatory resilience planning, collaborative dispute resolution procedures, and periodic contractual review mechanisms to improve long-term project sustainability.

Another significant area of scholarship concerns sustainable finance and investment security. Researchers argue that investors increasingly evaluate contractual resilience alongside technical and financial feasibility when financing major infrastructure projects. Well-designed contractual risk allocation enhances investor confidence, reduces financing costs, improves insurance availability, and strengthens project bankability. Consequently, international literature supports contractual innovation that balances governmental regulatory flexibility with commercial predictability (Manzoor et al., 2025).

Despite these important developments, comparative studies recognize continuing inconsistencies among jurisdictions regarding judicial interpretation, legislative intervention, and contractual drafting practices. Differences in legal traditions, regulatory structures, climate policies, and infrastructure financing models produce varying approaches to climate-related contractual disputes. Nevertheless, international scholarship consistently concludes that conventional legal distinctions between force majeure and change in law require reconsideration within broader frameworks emphasizing resilience, adaptability, and sustainable contractual governance (Zafar et al., 2024).

Research Gap

Existing literature provides extensive analysis of force majeure, change in law, and climate adaptation as separate areas of legal study. However, limited research critically examines their combined interaction within a unified contractual risk allocation framework. National scholarship remains largely doctrinal, while international studies emphasize comparative developments without proposing an integrated reconceptualization of both doctrines. This study addresses that gap by developing a climate-responsive conceptual framework that redefines force majeure and change in law to improve contractual resilience, legal certainty, and sustainable infrastructure governance in the era of climate adaptation.

RESEARCH METHODOLOGY

Research Design: Qualitative Doctrinal Approach

This study adopts a qualitative doctrinal research design to examine the evolving legal relationship between *force majeure* and *change in law* in the context of climate adaptation. The doctrinal approach is particularly appropriate because the research focuses on the interpretation, analysis, and critical evaluation of existing

legal principles governing contractual risk allocation rather than generating empirical evidence. It enables a systematic examination of legal doctrines, statutory provisions, judicial reasoning, and contractual principles to determine whether traditional legal concepts adequately respond to the increasing challenges posed by climate-related disruptions and evolving environmental regulations. The qualitative nature of the research facilitates an in-depth understanding of the conceptual and normative dimensions of contract law, allowing the study to assess how climate adaptation has influenced legal interpretations of unforeseen events and regulatory change. Through this approach, the research develops a coherent analytical framework for reconceptualizing these contractual doctrines in light of contemporary environmental realities.

The doctrinal methodology further enables the study to evaluate the consistency, adequacy, and effectiveness of existing legal rules governing force majeure and change in law across different legal contexts. It critically examines the interaction between established contractual principles and emerging climate governance without relying on numerical analysis or empirical investigation. By emphasizing legal reasoning, conceptual analysis, and comparative interpretation, the research seeks to identify doctrinal developments capable of improving contractual certainty, equitable risk allocation, and long-term resilience in commercial and infrastructure agreements.

Sources of Data: Secondary Legal Materials

The research relies exclusively on secondary legal materials to ensure a comprehensive doctrinal examination of the subject. These materials include scholarly books, peer-reviewed journal articles, legal commentaries, textbooks, conference papers, institutional publications, policy reports, and other academic literature relevant to contract law, environmental law, climate adaptation, and infrastructure governance. In addition, the study examines constitutional provisions, statutory enactments, delegated legislation, judicial decisions, arbitral principles, model contractual clauses, international legal instruments, and official guidance documents that contribute to the legal understanding of force majeure and change in law.

The selection of these materials is based upon their relevance, legal authority, analytical depth, and contribution to contemporary debates concerning climate-related contractual risk allocation. Particular emphasis is placed on recent academic discussions addressing climate resilience, environmental governance, sustainable infrastructure, commercial contracting, and regulatory transformation. Comparative legal materials are also considered where they provide valuable insights into evolving contractual practices and doctrinal developments across different jurisdictions. By integrating a broad range of authoritative secondary legal sources, the research establishes a comprehensive foundation for evaluating the adequacy of existing contractual doctrines in responding to climate adaptation challenges.

Method of Data Collection and Analysis

Data collection is conducted through an extensive review of relevant secondary legal literature obtained from academic databases, legal repositories, university libraries, government publications, institutional reports, and recognized legal journals. The collected materials are systematically organized according to major thematic areas, including force majeure, change in law, climate adaptation, contractual risk allocation, infrastructure contracts, environmental regulation, and sustainable commercial governance. This structured collection process ensures that the analysis encompasses both traditional legal principles and contemporary developments influencing contractual relationships.

The analysis employs doctrinal and qualitative content analysis methods to identify recurring legal principles, interpretative approaches, judicial trends, conceptual developments, and emerging contractual practices. Relevant legal materials are critically examined to compare traditional contractual doctrines with

evolving climate-responsive approaches adopted in contemporary legal scholarship and regulatory practice. Comparative analysis is used where appropriate to evaluate similarities and differences in legal reasoning across various jurisdictions and contractual frameworks. The findings are synthesized through thematic interpretation, enabling the research to identify areas of convergence, doctrinal inconsistencies, and opportunities for legal reform. This analytical process facilitates the development of an integrated conceptual framework capable of addressing the increasingly interconnected relationship between physical climate risks and regulatory change.

Scope, Limitations and Ethical Considerations

The scope of this research is confined to the doctrinal examination of *force majeure* and change in law within the context of climate adaptation and contractual risk allocation. The study primarily focuses on legal principles applicable to long-term commercial and infrastructure contracts, emphasizing the impact of climate-related physical events and environmental regulatory developments on contractual performance. It explores conceptual, legal, and comparative dimensions of the subject without undertaking empirical investigation or jurisdiction-specific statistical analysis.

Despite its comprehensive legal analysis, the study is subject to certain limitations. Since it relies exclusively on secondary legal materials, the findings are dependent upon the availability, quality, and scope of existing literature and legal authorities. Furthermore, differences in national legal systems, judicial interpretation, and contractual practices may limit the universal applicability of certain conclusions. Nevertheless, these limitations do not diminish the analytical value of the research because its principal objective is to develop a doctrinal understanding rather than produce empirical generalizations.

Ethical considerations are maintained throughout the research by ensuring academic integrity, objectivity, transparency, and proper acknowledgment of legal scholarship. The study critically evaluates diverse legal viewpoints without bias, accurately represents the arguments advanced in existing literature, and avoids plagiarism through appropriate scholarly practices. Since the research is based exclusively on publicly available secondary legal materials and does not involve human participants or confidential information, no ethical concerns relating to participant consent, privacy, or data confidentiality arise. These ethical principles enhance the credibility, reliability, and scholarly rigor of the research findings.

RESULTS AND DISCUSSION

Presentation of Key Legal Findings

The doctrinal analysis demonstrates that the traditional distinction between *force majeure* and *change in law* has become increasingly inadequate in the era of climate adaptation. The legal materials examined reveal that climate-related disruptions no longer arise solely from extraordinary natural events but also from evolving governmental responses aimed at enhancing environmental resilience and regulatory compliance. Consequently, contractual performance is often affected simultaneously by physical climate events and subsequent legislative or administrative interventions. This dual impact challenges the conventional assumption that *force majeure* addresses only external uncontrollable events while change in law governs exclusively regulatory developments.

The findings further indicate that contemporary infrastructure and long-term commercial contracts require a more dynamic approach to contractual risk allocation. Existing contractual provisions frequently fail to anticipate recurring climate-related events, stricter environmental standards, or mandatory adaptation measures introduced during the contractual period. As climate risks become increasingly foreseeable through scientific forecasting and environmental assessment, reliance upon traditional definitions of

unforeseeability becomes less effective. Instead, modern contractual practice increasingly emphasizes resilience, adaptability, and collaborative risk management.

Another significant finding concerns the growing interaction between public regulatory authority and private contractual autonomy. Governments continue to revise environmental legislation, disaster management policies, building standards, carbon reduction measures, and infrastructure resilience requirements in response to climate change. These legal developments directly influence contractual obligations, project costs, operational procedures, and financial viability. The study therefore finds that contractual certainty can no longer be achieved solely through rigid contractual drafting but requires flexible mechanisms capable of accommodating evolving environmental obligations throughout the duration of long-term agreements.

Analysis of Statutory Provisions and Case Law

The analysis of statutory provisions demonstrates that environmental governance has undergone substantial transformation as governments increasingly prioritize climate adaptation through comprehensive legislative reforms. Modern environmental statutes, infrastructure regulations, planning laws, disaster management frameworks, and sustainability standards collectively establish legal obligations that frequently alter contractual performance after agreements have been executed. These statutory developments significantly increase the relevance of change in law clauses, particularly where compliance requires additional investment, operational modification, or technological upgrading.

Judicial interpretation similarly reflects an evolving understanding of climate-related contractual disputes. Courts have traditionally interpreted force majeure clauses narrowly, requiring clear evidence that an unforeseen event was beyond the reasonable control of contracting parties and directly prevented contractual performance. However, the growing predictability of many climate-related hazards has encouraged greater judicial scrutiny regarding foreseeability, mitigation efforts, contractual risk allocation, and reasonable commercial expectations. Rather than automatically classifying environmental events as force majeure, legal reasoning increasingly considers whether parties should reasonably have anticipated and managed identifiable climate risks during contractual negotiations.

The analysis also demonstrates that judicial reasoning increasingly recognizes the interaction between physical climate events and governmental regulatory responses. Climate-induced flooding, prolonged droughts, coastal erosion, and extreme weather frequently trigger emergency legislation, revised environmental standards, or mandatory infrastructure adaptations that significantly influence contractual obligations. Consequently, courts increasingly encounter disputes involving both force majeure and change in law simultaneously, highlighting the limitations of treating these doctrines as entirely separate contractual concepts. This evolving legal landscape supports a more integrated interpretative approach that acknowledges the interconnected nature of climate-related contractual risks.

Comparison with Existing Scholarly Views

The findings correspond closely with contemporary legal scholarship advocating modernization of contractual risk allocation in response to climate change. Existing scholars generally agree that traditional contractual doctrines were developed within relatively stable regulatory and environmental conditions and therefore require adaptation to address the uncertainties created by climate governance. The present analysis reinforces these observations by demonstrating that contemporary contractual relationships increasingly involve overlapping physical, legal, financial, and regulatory risks that cannot be effectively managed through conventional contractual distinctions alone.

However, the study extends existing scholarly discussion by emphasizing that climate adaptation should not merely result in expanded interpretations of *force majeure* or broader application of change in law clauses independently. Instead, the findings support the development of an integrated contractual framework in which both doctrines operate as complementary mechanisms for managing interconnected climate-related risks. Such an approach reflects the practical realities of long-term infrastructure contracts where environmental events and regulatory interventions frequently occur in combination rather than isolation.

The research also aligns with scholarly arguments supporting adaptive contractual governance and resilience-based legal frameworks. Rather than prioritizing rigid contractual certainty, contemporary legal thinking increasingly values flexibility, cooperative problem-solving, periodic contractual review, and equitable redistribution of unforeseen climate-related burdens. The findings therefore strengthen academic arguments advocating climate-responsive contractual drafting capable of balancing commercial predictability with evolving environmental obligations and public policy objectives.

Implications of the Findings

The findings have significant implications for contractual drafting, judicial interpretation, legislative reform, and infrastructure governance. For contracting parties, the research demonstrates the necessity of incorporating detailed climate-specific provisions that clearly distinguish foreseeable environmental risks from genuinely exceptional circumstances while simultaneously addressing potential regulatory developments associated with climate adaptation. Such contractual innovation may substantially reduce future disputes and improve long-term project resilience.

For legislators and policymakers, the findings highlight the importance of developing legal frameworks that encourage balanced contractual risk allocation without discouraging investment in climate-resilient infrastructure. Clear statutory guidance concerning environmental compliance, regulatory transition, and contractual adjustment mechanisms can strengthen legal certainty while preserving governmental flexibility to implement evolving climate policies. Such measures also promote investor confidence by reducing uncertainty surrounding future regulatory intervention.

Judicial institutions may also benefit from adopting interpretative approaches that recognize the interconnected relationship between climate-related physical events and regulatory change rather than applying traditional contractual doctrines in isolation. This integrated perspective can improve consistency in judicial reasoning while ensuring that contractual outcomes remain equitable under rapidly changing environmental conditions.

More broadly, the research contributes to the ongoing development of climate-responsive contract law by demonstrating that resilience, adaptability, and collaborative risk management should become central principles of modern contractual governance. Reconceptualizing *force majeure* and change in law within an integrated legal framework enhances commercial certainty, supports sustainable infrastructure investment, facilitates effective climate adaptation, and strengthens the capacity of legal systems to respond to increasingly complex environmental challenges.

CONCLUSION

Summary of Major Findings

This study has examined the evolving relationship between *force majeure* and *change in law* within the broader context of climate adaptation and contemporary contractual risk allocation. The findings

demonstrate that traditional contractual doctrines, which historically treated natural disasters and regulatory changes as distinct legal categories, are increasingly insufficient for addressing the complex realities of climate-related disruptions. Climate change has fundamentally altered both the physical and regulatory environments in which long-term commercial and infrastructure contracts operate. Extreme weather events, environmental degradation, and climate adaptation measures have become closely interconnected, creating contractual situations in which physical events and governmental interventions frequently occur simultaneously. Consequently, rigid legal distinctions between force majeure and change in law no longer provide comprehensive solutions for allocating emerging climate risks.

The research further establishes that modern contractual relationships require greater flexibility, resilience, and adaptability than conventional legal frameworks traditionally permit. Existing contractual clauses often rely upon outdated assumptions regarding the unforeseeability of environmental events, despite increasing scientific knowledge regarding climate risks. Similarly, rapidly evolving environmental legislation and resilience standards have expanded the significance of change in law provisions beyond their original scope. The study therefore concludes that climate-responsive contractual drafting should integrate both doctrines into a coherent risk allocation framework capable of balancing commercial certainty with evolving environmental obligations. Such an approach strengthens contractual stability while supporting sustainable infrastructure development and long-term investment confidence.

Achievement of Research Objectives

The research successfully achieved all of its stated objectives. First, it examined the traditional legal concepts of force majeure and change in law by evaluating their historical development, legal characteristics, and functions within contract law. This analysis established the conceptual distinctions that have historically guided contractual interpretation and risk allocation.

Second, the study assessed the impact of climate adaptation on the interpretation and practical application of these contractual doctrines. The findings demonstrated that contemporary climate governance has significantly altered the legal environment through expanding environmental regulation, resilience standards, disaster management policies, and sustainability obligations, thereby influencing both contractual performance and legal interpretation.

Third, the research identified the principal legal challenges arising from the interaction between climate-induced physical events and regulatory developments. The analysis highlighted that overlapping climate risks frequently create uncertainty regarding contractual remedies, liability, compensation, and allocation of financial responsibility, particularly within long-term infrastructure agreements.

Fourth, the study evaluated the adequacy of existing contractual risk allocation mechanisms and concluded that conventional force majeure and change in law clauses often fail to accommodate the multidimensional nature of climate adaptation. Finally, the research proposed a climate-responsive conceptual framework that reconceptualizes these doctrines as complementary contractual mechanisms capable of promoting resilience, flexibility, equitable risk sharing, and greater legal certainty under evolving environmental conditions.

Limitations of the Study

Despite providing a comprehensive doctrinal examination, the study is subject to several limitations. The research relies exclusively on secondary legal materials, including legislation, judicial decisions, academic literature, and institutional publications. Consequently, its findings are confined to doctrinal interpretation and conceptual analysis rather than empirical evaluation of contractual practices or stakeholder experiences.

The absence of empirical data limits the ability to assess how contracting parties, arbitral tribunals, regulators, and commercial institutions practically implement climate-responsive contractual provisions across different sectors.

Additionally, variations among national legal systems, judicial approaches, environmental policies, and contractual drafting practices may influence the applicability of certain conclusions across jurisdictions. Climate adaptation policies continue to evolve rapidly, and future legislative developments, judicial decisions, and international environmental commitments may further reshape contractual risk allocation. Therefore, while the proposed conceptual framework offers broad legal relevance, its practical application may require contextual adaptation according to specific legal systems, regulatory structures, and commercial sectors.

Concluding Remarks

The accelerating impacts of climate change have transformed contractual risk from a relatively predictable legal concern into a dynamic and continuously evolving challenge. As governments strengthen climate adaptation measures and environmental regulation, contractual relationships increasingly operate within legal environments characterized by ongoing regulatory transformation and growing environmental uncertainty. Under these circumstances, traditional contractual doctrines cannot remain static if they are to continue fulfilling their fundamental purpose of promoting fairness, commercial certainty, and effective risk allocation.

This study concludes that reconceptualizing *force majeure* and change in law is both a legal necessity and a practical imperative for modern contract law. Rather than functioning as isolated doctrines, these contractual mechanisms should operate within an integrated climate-responsive framework that recognizes the interaction between physical climate events and regulatory adaptation measures. Such an approach encourages proactive contractual planning, collaborative risk management, and flexible legal interpretation while preserving the legitimate expectations of contracting parties. Ultimately, a climate-responsive model of contractual governance strengthens the resilience of commercial relationships, enhances investor confidence, supports sustainable infrastructure development, and contributes to the continued evolution of contract law in response to the unprecedented legal and environmental challenges of the twenty-first century.

RECOMMENDATIONS

Legal and Policy Recommendations

The findings of this study demonstrate the need for comprehensive legal and policy reforms to ensure that contractual frameworks adequately address the challenges posed by climate adaptation. Legislatures should modernize contract law by providing clearer statutory guidance on the interpretation and application of *force majeure* and *change in law* clauses in climate-related disputes. Legal definitions should acknowledge that climate risks increasingly involve both physical events and evolving regulatory responses, thereby reducing ambiguity in contractual interpretation. Policymakers should also encourage the incorporation of climate-responsive contractual provisions in long-term infrastructure, energy, water, transportation, and public-private partnership agreements. These provisions should clearly define climate-related events, establish transparent procedures for notification and mitigation, and provide equitable mechanisms for renegotiation, compensation, and contractual adjustment when environmental regulations significantly affect contractual performance.

Governments should further promote the adoption of standardized model clauses that specifically address climate adaptation risks while preserving sufficient flexibility to accommodate project-specific circumstances. Such standardized provisions would enhance legal certainty, reduce transactional costs, and minimize contractual disputes arising from inconsistent drafting practices. Environmental legislation and infrastructure policies should also be coordinated with commercial law reforms to ensure that regulatory developments support sustainable investment without creating unnecessary contractual uncertainty. Integrating climate resilience into procurement policies, concession agreements, and public infrastructure contracts would strengthen long-term project sustainability while encouraging responsible private-sector participation.

Institutional Reforms

Institutional reforms are equally essential for improving the implementation and interpretation of climate-responsive contractual frameworks. Judicial institutions should strengthen their capacity to adjudicate climate-related contractual disputes by promoting specialized judicial education on environmental governance, infrastructure regulation, and emerging principles of climate adaptation. Greater judicial familiarity with climate science and evolving regulatory frameworks would contribute to more consistent interpretation of force majeure and change in law clauses.

Arbitral institutions should similarly develop specialized procedural guidelines for resolving disputes involving climate-related contractual risks. Since many international infrastructure contracts rely upon arbitration, incorporating climate-specific expertise into arbitral proceedings would improve the quality and consistency of dispute resolution. Regulatory agencies responsible for environmental protection, infrastructure development, and public procurement should coordinate their policies to ensure that contractual obligations remain compatible with evolving climate adaptation strategies.

In addition, governments should encourage stronger collaboration among regulators, project developers, financial institutions, insurers, and legal practitioners during contract negotiation and implementation. Institutional coordination can facilitate the development of balanced contractual frameworks that allocate climate-related risks fairly while preserving commercial certainty and investment stability. Such collaborative governance would reduce adversarial disputes and promote proactive contractual adaptation throughout the life cycle of long-term projects.

Recommendations for Future Doctrinal Research

Future doctrinal research should continue examining the interaction between climate adaptation and contractual risk allocation as environmental governance evolves. Comparative legal studies across different jurisdictions would provide valuable insights into emerging judicial approaches, legislative reforms, and contractual innovations addressing climate-related uncertainty. Such comparative analysis could identify best practices capable of informing harmonized contractual standards for international infrastructure and commercial agreements.

Further research should also explore the relationship between force majeure, hardship, frustration, change in law, and other contractual doctrines that may increasingly overlap in climate-related disputes. Greater attention should be devoted to the interaction between domestic contract law, international investment law, environmental law, and sustainable development principles to develop integrated legal frameworks capable of addressing multidimensional climate risks.

Additionally, doctrinal studies should examine the implications of emerging technologies, climate forecasting tools, artificial intelligence, and digital risk assessment systems for contractual interpretation

and climate risk management. As predictive technologies improve, future legal scholarship should reconsider traditional concepts of foreseeability, reasonable diligence, and contractual responsibility within increasingly data-driven commercial environments. Such research would contribute to the continued modernization of contract law in response to rapidly evolving environmental conditions.

Way Forward

The future development of contract law requires a shift from static risk allocation toward adaptive contractual governance capable of responding to the realities of climate change. Force majeure and change in law should no longer be viewed as isolated contractual mechanisms but as complementary components of an integrated legal framework designed to manage interconnected physical, regulatory, financial, and operational risks. This reconceptualization should prioritize resilience, flexibility, cooperation, and long-term sustainability while preserving legal certainty and commercial predictability.

Moving forward, governments, legal institutions, commercial actors, and infrastructure developers should adopt a proactive approach to contractual drafting by incorporating climate-specific risk allocation mechanisms into long-term agreements. Standard contractual practices should include periodic contractual review, adaptive compliance mechanisms, collaborative dispute resolution procedures, and clearly defined processes for responding to evolving climate regulations and environmental events. Strengthening coordination between environmental governance and commercial law will further enhance the effectiveness of contractual risk management.

Ultimately, a climate-responsive contractual framework represents not merely an adjustment to existing legal doctrines but a necessary evolution of modern contract law. By embracing adaptive legal principles and resilience-oriented governance, legal systems can better protect contractual stability, encourage sustainable investment, reduce future disputes, and support the successful implementation of climate adaptation policies in an increasingly uncertain global environment.

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