

Research Article

Provisions of Liability Related to Spacecraft Collisions: "A Sharia Perspective"

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Abstract: The growing utilisation of outer space has given rise to significant legal challenges, particularly in relation to determining liability for collisions involving spacecraft. While international treaties offer a foundational legal structure, there remains a notable gap in the examination of how Islamic jurisprudence (Sharia) addresses such circumstances. This study adopts a normative juridical methodology in conjunction with a qualitative framework to assess liability for spacecraft collisions from an Islamic legal perspective. Content analysis was employed to facilitate a nuanced investigation of the convergence between Sharia principles and international space law. Findings indicate that liability in incidents involving spacecraft typically hinges upon the presence of fault or negligence. Within this context, Islamic jurisprudence exempts parties from responsibility in instances of unavoidable or uncontrollable occurrences. Conversely, in situations where collisions are caused intentionally or due to negligence, resulting in harm or fatality—Sharia mandates proportional liability and compensation (diya). The study further identifies divergent interpretations among various Islamic schools of thought concerning the degree of culpability and the application of retaliatory measures. By integrating Islamic legal doctrines with the existing framework of international space law, this research enhances the theoretical understanding of liability in space activities. Emphasis is placed on key legal factors such as fault, intentionality, and the extent of operational control in the event of a collision. The outcomes of this analysis are intended to support policymakers and space industry stakeholders in establishing comprehensive liability and compensation protocols, thereby contributing to more defined legal responsibilities and effective risk mitigation strategies in space exploration initiatives.

Keywords: Space, Spacecraft, Collision, Liability, Debris, Accidents.

1. Introduction

The peaceful utilisation of outer space holds substantial strategic value for nations, functioning as a cornerstone of soft power and a symbol of national leadership in the realm of global space policy. It significantly contributes to space diplomacy by facilitating international collaboration and ensuring compliance with established space treaties. This role becomes especially pertinent in a global landscape shaped by intensifying geopolitical and geo-economic rivalries. Nonetheless, the escalating exploitation of space has led to a sharp rise in orbital debris, mirroring the global surge in space-related activities.

Recent figures underscore the rapid expansion of the space sector. As reported by the Space Foundation, the global space economy reached a valuation of \$570 billion in 2023, reflecting a 7.4% increase from the previous year, with commercial revenues constituting approximately 78% of this total [1]. Moreover, projections from McKinsey & Company suggest that the space economy could grow to \$1.8 trillion by 2035, indicating an average annual growth rate of 9% [2]. These statistics illustrate not only the intensifying global interest in space exploration and commercial ventures but also the corresponding increase in risks, including spacecraft collisions—an issue that demands urgent legal scrutiny. Current international legal frameworks addressing liability in space are limited in both scope and precision. Additionally, there exists a notable deficiency in scholarship exploring accountability through diverse legal and ethical lenses. In particular, there is insufficient analysis of how Islamic jurisprudence (Sharia) interprets and applies the concept of liability in the context of advanced technological domains. This gap signifies a lack of integration between religious legal traditions and the modern discourse on space law and responsibility.

The rationale behind this study is rooted in the growing participation of Muslim-majority states in space exploration and the rising potential for legal conflicts resulting from space-related accidents. While international space law provides a secular foundation for adjudicating liability, it does not incorporate the religious legal systems, such as Sharia, that inform governance and legal interpretation in Islamic countries. These states are increasingly active in launching satellites and participating in the space

economy. According to Group [3], the United Arab Emirates has dispatched the HOPE probe to Mars and is currently developing a constellation of high-resolution imaging satellites as part of its National Space Strategy 2030.

Similarly, Saudi Arabia has made substantial investments in its space programme, including the deployment of astronauts to the International Space Station and advancements in domestic satellite technologies [4]. Iran has also intensified its space initiatives, with plans to launch several domestically produced satellites and encourage private sector engagement in space ventures, as reported by the [5]. These developments demonstrate the increasing involvement of Muslim-majority nations in the global space economy and underscore the necessity of evaluating liability norms from an Islamic legal perspective, particularly in the context of spacecraft collisions.

Consequently, there is an urgent need to investigate the role that Islamic jurisprudence can play in addressing legal questions related to fault, reparation, and preventative measures in space activities. This research aims to address this scholarly gap by merging Islamic legal doctrines with contemporary issues in space law. It aspires to offer a culturally contextualised and legally robust framework suitable for Muslim-majority countries participating in international space governance. Accordingly, the central research question guiding this study is: What legal and ethical frameworks underpin liability and accountability for damage arising from spacecraft collisions, particularly from the standpoint of Sharia? The primary objective is to analyse both secular and Islamic legal constructs to provide clarity on liability issues in space incidents, thereby contributing to the resolution of disputes and the regulation of space activities.

2. Literature Review

Ruhaeni and Izadi [6] have investigated the exploration of outer space through the lenses of both international space law and Islamic perspectives. Their study emphasises the conceptualisation of outer space as depicted in the Qur'an and examines various implications of Islamic teachings in guiding human endeavours in space. Accordingly,

considerations of liability for damages caused by space objects are also examined within this framework. Similarly, Al-Hajj [7] analysed international liability regimes established by treaties such as the Outer Space Treaty and the Liability Convention, incorporating Islamic legal perspectives on liability. This analysis explored how Sharia principles might inform and potentially complement international legal standards concerning damages arising from space activities.

The United Nations has consistently sought to preserve outer space for peaceful purposes, aiming to preclude military use and the deployment of weapons of mass destruction in orbit. As noted by the United Nations Office for Disarmament Affairs (UNODA), efforts to maintain outer space for peaceful utilisation began in 1957, prior to the launch of the first artificial satellite (UNODA). The Outer Space Treaty, formally the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, came into effect in 1967 and serves as the foundational framework for international space law. This treaty underscores the peaceful exploration and utilisation of space, prohibits the placement of nuclear weapons in orbit, and asserts that outer space is not subject to national appropriation.

However, the use of outer space has led to an accumulation of debris—commonly referred to as space junk—comprising abandoned launch vehicles and spacecraft fragments, which pose collision risks to satellites and space stations. Horbachova and Bazyey [8] highlighted the escalating threat posed by space debris, noting a sevenfold increase in collision risk within Low Earth Orbit (LEO), primarily attributed to past satellite destructions and the deployment of large constellations such as Star link. Their research emphasised the urgent need for debris mitigation and predictive modelling to prevent repetition of risks accumulated over the past six decades. Likewise, Nomura, Rella [9] employed complex systems and social-ecological approaches to assess space debris dynamics, identifying future launch rates, clean-up activities, and collisions among existing debris as critical influencing factors. They warned of the potential for reaching a critical threshold known as the Kessler Syndrome, whereby the density of debris in LEO could precipitate exponential increases in collisions, rendering certain orbital regions unusable. Their study further stressed the imperative for international cooperation and proactive strategies to mitigate debris accumulation and ensure the long-term sustainability of space operations.

Hall and Baars [10] investigated methods for estimating collision and fragmentation risks associated with unidentified space debris through the integration of radar cross-section (RCS) data. Their findings indicate that most satellite conjunctions involve untracked debris, underscoring the necessity for precise risk assessment and careful consideration of uncertainties in such estimations. In a related vein, Saari [11] examined the application of the Islamic principle of Wasatiyyah (moderation and justice) in the formulation of Malaysia's national space legislation. This study highlighted the objectives of Shariah (Maqasid al-Shariah) as central to ensuring justice and balance when addressing space-related challenges, including liability issues arising from space activities. Al-Hajj [7] further analysed international legal frameworks governing liability for damages caused by space objects, focusing on the Outer Space Treaty and the Liability Convention. This research elucidated the doctrines of absolute and fault-based liability and explored their ramifications from the perspective of Islamic jurisprudence. The study emphasised the necessity for effective dispute resolution mechanisms in cases of damages linked to space operations.

Collectively, these scholars contribute a comprehensive understanding of the legal and ethical dimensions of space activities, particularly concerning liability for spacecraft collisions. From an Islamic viewpoint, the significance of Shariah principles—such as justice, moderation (Wasatiyyah), and the preservation of human welfare (Maqasid al-Shariah)—is underlined as pivotal in shaping and potentially enriching international liability frameworks like the Outer Space Treaty and the Liability Convention. These insights demonstrate that Islamic jurisprudence is crucial for framing ethical and legal norms within the governance of outer space. Concurrently, research on space debris highlights the escalating risks posed by orbital fragments, underscoring the urgent requirement for coordinated global initiatives, advanced monitoring technologies, and predictive modelling to mitigate these dangers. Consequently, integrating both international legal standards and moral-religious frameworks is essential to promote the safe, equitable, and sustainable utilisation of outer space.

Table 1: Summary of Literature Review

Author	Focus	Key Contribution
Ruhaeni and Izadi [6]	Space Law and Quranic Perspective	Islam can Guide Space Activity Ethics and Liability

Author	Focus	Key Contribution
Al-Hajj [7]	International vs. Islamic Liability Laws	Sharia Complements Global Treaties on Space Damage Responsibility

Table 1: Summary of Literature Review (continued)

Affairs [12]	Peaceful Use of Space; Outer Space Treaty	Legal Foundation Prohibiting WMDs; Promotes Peaceful Exploration
Horbachova and Bazyey [8]	Collision Risk from Space Debris	Urges Debris Mitigation Due to Growing LEO Threats
Nomura, Rella [9]	System Dynamics of Debris and Kessler Syndrome	Highlights the Urgent Need for Global Cooperation to Prevent Orbital Loss
Hall and Baars [10]	Risk Estimation from Unknown Debris	Accurate Risk Modelling using Radar Data is Essential
Saari [11]	The Islamic Principle of Wasatiyyah in Space Law	Advocates Justice and Moderation in Space Legislation Via Sharia

3. Methodology

This study employed a normative juridical approach, with the objective of examining liability provisions related to spacecraft collisions from a Sharia perspective. A qualitative research methodology was adopted to facilitate a comprehensive and interpretive analysis encompassing both international space law and Islamic legal principles. The research was grounded in the philosophy of interpretivism, which supports an in-depth exploration of Shariah principles and their potential influence on global legal norms concerning liability in space activities. An inductive research strategy was utilised to derive insights from existing treaties and legal frameworks. Primary data sources comprised international legal instruments, Shariah legal commentaries, and scholarly interpretations, among others. Secondary data were collected from peer-reviewed journals and established legal databases, including HeinOnline, JSTOR, Westlaw, and repositories dedicated to Islamic law. For data analysis, content analysis was employed as the principal method, enabling systematic evaluation and interpretation of legal texts. This approach also facilitated the examination of the intersections between international liability standards and the ethical and legal values inherent in Islam.

4. Results and Discussion

4.1 Legal Ruling on Liability Related to Spacecraft Collisions

- Definitions of spacecraft collisions

Linguistic Definition of Collision: A collision is defined as the impact of one solid object against another. Webster [13] describes it as "an act or instance of colliding: clash." With regard to spacecraft, this term refers to a vehicle designed to transport people and cargo beyond Earth's atmosphere into space, whether to other planetary bodies, space stations, or orbital paths, with the ability to return to Earth.

4.2 A Historical Overview of Spacecraft Collision Incidents

The first fatal incident in American spaceflight history occurred on 27 January 1967, as documented by NASA. A fire erupted within the command module, tragically resulting in the deaths of astronauts Virgil "Gus" Grissom, Edward H. White II, and Roger B. Chaffee [14]. This event represented a critical juncture for NASA's space programme, prompting thorough investigations and comprehensive reforms in safety protocols. Merely three months later, the Soviet cosmonaut Vladimir Komarov became the first human casualty during a space mission [15]. The Soyuz 1 spacecraft, intended for lunar exploration, suffered a fatal failure during re-entry, crashing back to Earth on 24 April 1967.

In April 1971, the Soviet Union successfully deployed the world's inaugural space station, Salyut 1 [16]. Subsequently, in June, three cosmonauts aboard Soyuz 11 conducted a three-week series of scientific experiments and observations while stationed there. However, during their return on 30 June, although the spacecraft re-entered the atmosphere and landed automatically without apparent issue, ground personnel discovered the crew unresponsive upon hatch opening. Investigation revealed that a malfunctioning valve had opened during the separation of the orbital and

re-entry modules, leading to cabin depressurisation. Since none of the crew were equipped with spacesuits, they likely died from asphyxiation approximately thirty minutes prior to landing.

On the frigid morning of 28 January 1986, the Space Shuttle Challenger catastrophically disintegrated 73 seconds after lift-off from Cape Canaveral. The debris field extended over the Atlantic Ocean from an altitude near 50,000 feet. This accident remains the deadliest in the history of the United States space programme. All seven astronauts aboard perished, including Christa McAuliffe, a high school teacher participating in the national "Teacher in Space" programme. Subsequent investigations determined that NASA was aware that extremely low temperatures could compromise the rubber O-rings sealing the solid rocket boosters but proceeded with the launch regardless. This decision elicited widespread public condemnation and resulted in the temporary suspension of the shuttle programme.

After completing a 16-day mission, the Space Shuttle Columbia, which had inaugurated the shuttle programme's flights in 1981, was re-entering Earth's atmosphere for its planned landing at Cape Canaveral when disaster struck. The orbiter broke apart over eastern Texas, scattering debris over a large area and resulting in the deaths of all seven astronauts on board. The catastrophe was caused by a piece of insulating foam detaching from the external fuel tank during launch and striking the shuttle's left wing. Similar foam shedding had occurred on prior launches without causing harm, leading NASA officials to underestimate the risk. However, during re-entry, hot gases penetrated the damaged wing, causing structural failure and eventual disintegration of the spacecraft. The Columbia tragedy marked the beginning of the decline of the U.S. Space Shuttle programme. NASA suspended flights for over two years to conduct investigations and implement safety improvements [17]. Ultimately, this disaster contributed to the decision to retire the Space Shuttle fleet in 2011.

4.3. The Dangers of Space Debris

Space debris, also referred to as orbital debris or space junk, denotes human-made objects orbiting the Earth that are no longer deemed functional or purposeful [18]. This category encompasses defunct satellites, spent rocket stages, fragments resulting from satellite collisions, and even minute particles such as flakes of paint [18]. According to the European Space Agency (ESA), the aggregate mass of all objects in Earth's orbit surpasses 14,000 tonnes. This figure comprises both catalogued items and estimated debris, which are systematically monitored by space surveillance networks utilising statistical models [19].

NASA further indicates that debris residing in orbits below 600 kilometres generally re-enters the Earth's atmosphere within a few years. Such orbital debris moves at exceedingly high velocities, approximately 25,265 kilometres per hour in low Earth orbit, thereby presenting a considerable risk of inflicting damage on satellites or spacecraft in the event of collision. Luisa Innocenti, Head of the Clean Space Office at the ESA, highlights the critical factor of velocity, stating, "The crucial aspect is the speed at which even the smallest objects travel in space. Such velocity can cause the destruction of another object or satellite upon impact, resulting in a cloud of debris. Consequently, every fragment of debris is highly consequential."

In response to this pressing issue, approximately 200 European specialists in orbital debris convene annually at ESA's Technology Centre in the Netherlands. This assembly comprises satellite and rocket manufacturers alongside representatives from various space agencies, all collaborating to develop effective strategies for space debris mitigation. While space debris is unlikely to completely obstruct access to space, it poses significant challenges for operations in Earth's orbit. The risk is particularly acute for spacecraft operating at altitudes near 1,000 kilometres, where many communication and Earth observation satellites function.

4.4. Liability Cases in Spacecraft Collisions

International space law addresses liability through the Convention on International Liability for Damage Caused by Space Objects, commonly referred to as the Liability Convention. Liability for damage caused by space objects is determined primarily by the location where the damage occurs and the existence of fault. Article III of the Liability Convention specifies that, in cases where damage caused by a space object affects another space object in outer space, the launching State is held liable only if such damage results from its own fault or that of individuals for whom it is responsible [20]. On this basis, three possible scenarios of liability have been identified, which will be examined in the subsequent subsections.

4.5. Liability in the Case of Collision without Misconduct or Negligence

When spacecraft collide unintentionally without any misconduct or negligence by the operator, for instance due to severe solar winds or lack of gravitational control making the spacecraft uncontrollable, the question arises whether liability applies. Scholars hold two differing views:

First Opinion: Liability applies even absent negligence or misconduct. This opinion is held by some Shafi'i scholars, supported by the following arguments:

First Evidence: The operator controls the spacecraft; therefore, any damage caused is liable even without fault, analogous to two horse riders colliding while both maintain control of their horses.

Rebuttal: There is a clear distinction between a horseman and a spacecraft operator; the former can steer the horse directly with reins, while the latter cannot exert direct control over the spacecraft under such uncontrollable circumstances.

Second Evidence: Responsibility lies with whoever initiates the action causing harm, even if external forces contribute—for example, someone shooting an arrow which the wind carries to injure a person.

Rebuttal: Even if the archer's liability is accepted, the spacecraft operator differs as they did not commit a blameworthy act akin to shooting an arrow.

Second Opinion: No liability arises for either party. This view is derived from the Hanafi school, adopted by the Maliki school, considered the stronger opinion among Shafi'i scholars, and supported by the Hanbali school and Ibn Hazm of the Zahiri school. Their reasoning includes:

First Evidence: Operators cannot fully control the spacecraft under such conditions; thus, they should not be held liable, as expressed in the Qur'an:

"Allah does not burden a soul beyond that it can bear" (Surah Al-Baqarah: 285).

Second Evidence: The damage from the collision results from external causes such as solar winds or gravitational anomalies.

Third Evidence: The destruction was caused by unavoidable factors rather than negligence.

Preferred Opinion: The second perspective is regarded as the stronger one, based on the evidence and its alignment with Islamic legal principles exempting individuals from accountability for uncontrollable events.

It is important to consider that standards for negligence must correspond to the era's prevailing norms. Early scholars distinguished between a horse, which can be guided by reins, and a ship, primarily driven by wind. In modern times, spacecraft can be largely controlled via powerful engines and navigation systems such as radar, which help avoid many collisions with other spacecraft or celestial bodies. These factors must therefore be accounted for when assessing the operator's capacity to control the spacecraft.

4.6. Liability for Collisions Due to Negligence or Carelessness

According to international space law, particularly the 1972 Convention on International Liability for Damage Caused by Space Objects (commonly known as the Liability Convention), liability for damage arising from space objects in outer space is contingent upon fault. This implies that if a spacecraft collides with another due to an error or negligence attributable to the spacecraft operator, the responsible party will bear liability for the damages incurred. Article III of the Liability Convention stipulates that the launching state is liable for damage caused by its space object in outer space, but this liability is confined to situations where the damage arises from the fault of the state itself or individuals for whom it is responsible [21]. The legal framework establishes that negligence or misconduct by the operator, resulting in a collision, imposes liability upon the launching state. Negligence can take various forms, including:

1. The spacecraft operator had the capacity to control the spacecraft but failed to exercise such control.
2. The operator could have directed the spacecraft away from danger but did not.
3. The operator neglected the maintenance of essential spacecraft equipment, such as engines or safety mechanisms critical for proper operation.
4. The operator operated the spacecraft under hazardous conditions for which it was not designed.

Scholars hold divergent views regarding the extent of liability owed by each operator involved in the collision, presenting two main perspectives:

First Opinion: When the spacecraft are owned by the operators, they

should indemnify each other proportionate to their respective shares. However, if they are employees acting under hire, they bear liability individually without compensation between them, as the entitlement to compensation differs from the obligation to pay. This view is upheld by Hanbali scholars.

Rebuttal: The damage is not exclusively attributable to one operator's actions, as both contributed; thus, liability should be apportioned according to each party's degree of fault.

Second Opinion: When both spacecraft and their contents belong to the respective operators, each operator is liable for half the value of the other's spacecraft and half the value of its contents, while the remaining half is considered forfeited. If the spacecraft belongs to third parties, each operator is responsible for half the value of their own spacecraft and its contents, as well as half the value of the other spacecraft and its contents. Owners may opt either to recover the full value of their spacecraft from one custodian and then claim half from the other, or to claim half from each custodian separately. This perspective aligns with the Shafi'i school of thought.

This stance is founded on the recognition that both operators contributed to the damage, as the loss arose from actions on both sides. Therefore, the operator's own vehicle loss is forfeited, but compensation is owed for the other party's vehicle, analogous to a situation in which both parties sustain injury while causing harm to each other.

4.7. Liability for Persons in Spacecraft Collisions

In the event that a collision between spacecraft causes injury or harm to individuals, is the operator of the spacecraft invariably held liable regardless of circumstances?

- Liability for Persons in a Collision Without Negligence**

As outlined earlier, scholars hold two differing views on liability, both in cases involving negligence and those without. The principles they have articulated concerning liability for property damage are similarly applicable to harm caused to individuals. The prevailing opinion among scholars is that liability should not be imposed in such instances. Ultimately, the final judgement rests with Allah's wisdom.

- Liability for Persons in a Collision Resulting from Negligence**

Within Islamic jurisprudence, scholars contend that liability arises when harm is caused by negligence or lack of due care. Negligence is defined as the failure to exercise appropriate caution, resulting in foreseeable harm to others. Al-Zuhayli notes that if an individual exercises their rights without the necessary care and precautions, thereby causing harm to others, they are deemed negligent and held accountable for the resulting consequences [22]. This principle is firmly rooted in Islamic law, which underscores the responsibility of individuals for the outcomes of their negligent conduct.

- Liability for Persons in Intentional Collision of Spacecraft**

If a spacecraft collides intentionally, resulting in the loss of life, scholars have differing opinions on this matter:

First Opinion: No retaliation (Qisas) is mandated against the spacecraft operator, as the situation is likened to two horses colliding. Here, the ruling moves towards compensation (diya), and the death is treated as quasi-intentional (shibh 'amd). Consequently, each operator's family is responsible for paying half of the diya for the other's loss if death occurs. This viewpoint is held by the Hanafi school but is regarded as a weaker stance by the Maliki school. However, Maliki scholars argue that the diya should be paid from the operator's estate. They reason that the intent behind this act is similar to an error because it is considered quasi-intentional: the operator caused the collision deliberately but without intending to cause death, hence the diya obligation falls on their family (aqil).

Response: It is inaccurate to assert that a person who deliberately causes a collision lacks intent to kill. The intent to kill may or may not be present, and therefore, the legal consequence must depend on the specific intent involved.

Second Opinion: Retaliation (Qisas) is compulsory for any operator who intentionally causes a collision that results in death. This view is preferred within the Maliki school, which equates an intentional collision to striking someone with a heavy object causing fatal injury.

Response: Again, it is incorrect to assume that intentional collision automatically means no intent to kill. The ruling must consider whether the

operator indeed intended to kill or not.

Third Opinion: A distinction is drawn regarding whether the collision is likely to cause death. This position is embraced by the Shafi'i and Hanbali schools as follows:

- When the collision is sufficiently severe to likely cause death, as determined by experts, and if a respected individual dies due to it, retaliation (Qisas) applies. The Shafi'i scholars maintain that the operator's act constitutes intentional killing by causing a life-threatening collision. In cases with multiple fatalities, they propose a lottery to decide which victim's retaliation applies. Furthermore, the families of other victims are entitled to half the diya for each death, along with compensation for religious expiations (kafarat) for every deceased individual.
- The Hanbali school holds that if the heirs forgive the operator, this waiver suffices and no further claims exist beyond the killing itself. However, if one heir demands retaliation and others seek diya, both rights remain valid. According to both Shafi'i and Hanbali schools, if only one operator intentionally caused the collision, they alone are subject to retaliation (Qisas).

Second, if the collision caused by the operator is unlikely to result in death: In such instances, the killing is regarded as quasi-intentional, and the families (aqil) of each operator must pay the magnified diya. The expiations (kafarat) are covered by their property, since the scenario is comparable to someone being thrown into shallow water and drowning, which Islamic law views as quasi-intentional homicide.

Preferred Opinion: The third viewpoint, which distinguishes between collisions that are likely to cause death and those unlikely to do so, is preferred. It offers a balanced approach, mediating between ignoring intent entirely and regarding it as decisive. Factors such as the spacecraft's location at impact, the nature of the collision, and survival prospects all influence whether the killing is deemed intentional or quasi-intentional. As previously noted, the Shafi'i stance is favoured, requiring each operator's family (aqil) to pay half the diya for the other, which suffices as reparation.

4.8. Subsequent Issue: If the Two Spacecraft Only Had the Operators Onboard and Both Died

- First Opinion: According to the Shafi'i school, the family (aqil) of each operator is obligated to pay half of the magnified diya to the other party. The rationale behind this partial diya payment was detailed earlier, while the increase in the amount reflects the quasi-intentional nature of the killing. Furthermore, each family bears responsibility for two sets of expiations (kafarat): one for the death of their own operator and another for the death of the opposing operator, as expiations cannot be split and must be fully undertaken by the party causing the killing.
- Second Opinion: The Hanbali school holds that the family (aqil) of each operator should pay the full magnified diya for the other, with each operator personally liable for the associated expiation costs, which are to be covered from their own property. This perspective draws an analogy with the collision of two horses and represents the position adopted by the Hanbali scholars.

Table 2: Spacecraft Collision Liability & Sharia Perspective

Aspect	Summary	Sharia View
International Law	States Liable under Treaties (OST, Liability Convention)	Supports State Accountability
National Law	Domestic Laws Enforce Global Norms	Aligns with Contractual Responsibility
Civil Liability	Based on Fault or Strict Liability	Reflects Sharia Concepts of Harm and Restitution
Ethics	Emphasises Prevention and Safety	Matches Sharia's No-Harm Principle
Sharia Law	Focus on Justice, Intent, and Restitution	Core to Assigning Moral/Legal Responsibility
Comparative Law	Secular and Islamic Laws Overlap	Encourages Hybrid Legal Models
Case Analysis	Islamic Models for Future Space Disputes	Ijtihad can Guide Rulings
Policy	Calls for Reform Blending Global and Islamic Norms	Aligns with Maqasid Al-Shariah

The findings indicate that liability for spacecraft collisions is regulated by both international and national legal frameworks. This regulation is consistent with Sharia principles emphasising justice, compensation, and the prevention of harm. Moreover, Sharia law can serve as a complementary system to existing regulations by providing ethical and moral guidance concerning responsibility and the promotion of public welfare.

5. Conclusion

The present study emphasises the intricate legal landscape surrounding liability for spacecraft collisions. It synthesises international space law with Islamic jurisprudence to address critical issues such as fault, negligence, and intent. The research highlights the necessity of clearly delineating responsibility in cases of both accidental and intentional collisions to guarantee equitable compensation and accountability. The findings hold significant value as they contribute to the advancement of more comprehensive legal frameworks, thereby enabling improved risk management. Furthermore, these frameworks offer protection to all stakeholders involved in space activities, especially as human presence in space continues to expand.

6. Research Implications

6.1. Theoretical Implications

The present study makes a substantial contribution to the growing body of literature and carries several important theoretical implications. It serves to bridge the gap between modern international space law and traditional Islamic jurisprudence, demonstrating that principles derived from Sharia can offer a complementary ethical and legal framework for addressing liability in outer space. This integration presents a challenge to the dominant secular approach within space law by emphasising a value-based perspective focused on accountability and moral responsibility. From a theoretical perspective, the study enriches the discourse on legal pluralism by showing how religious legal systems, such as Sharia, can interact with and potentially enhance international treaties. In this context, foundational instruments like the Outer Space Treaty and the Liability Convention hold particular significance. Furthermore, the research underscores the adaptability of Islamic legal maxims (Qawa'id Fiqhiyyah) in responding to emerging technological and environmental challenges within space governance. Accordingly, the scope of Sharia's applicability may be extended to address contemporary global legal issues in the twenty-first century.

6.2. Practical Implications

The present study further encompasses several practical implications. It illustrates how the integration of Sharia principles can enhance existing liability frameworks concerning spacecraft collisions. In countries governed by Islamic legal systems, incorporating Sharia-based concepts carries significant practical value. Notions such as Daman (compensation) and Mas'uliyah (accountability) provide clearer directives for assigning responsibility, thereby ensuring adequate justice in cases of space-related harm. This facilitates policymakers in the drafting of national space legislation that aligns with both international obligations and Islamic religious values. Furthermore, the study encourages the establishment of dispute resolution mechanisms grounded in both international law and Islamic ethical principles, fostering more inclusive and culturally sensitive legal practices. The findings hold particular importance for promoting international collaboration, emphasising the role that ethical frameworks like Sharia can play in encouraging responsible conduct within space activities. Consequently, the study offers practical contributions towards the long-term sustainability of outer space operations.

7. Limitations and Future Research Indications

Although the present study presents several significant implications, it is subject to certain limitations that offer opportunities for future investigation. Primarily, this research relies on a qualitative and normative juridical methodology, which restricts the ability to fully capture the practical challenges encountered in applying liability provisions across diverse legal systems. The integration of Sharia with international space law remains largely theoretical, as the lack of empirical data or case studies involving actual spacecraft collisions within Islamic legal contexts limits the practical relevance of the conclusions. Additionally, interpretations of Sharia principles may differ among various schools of thought, potentially leading to inconsistencies in legal application. Future studies could benefit from conducting comparative analyses of different Islamic jurisdictions and their respective approaches to space liability. Most critically, incorporating empirical case studies would enhance understanding of how Islamic legal frameworks operate in real-world disputes related to space activities.

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