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REVIEW ARTICLE

Review Article

EXCEPTIONAL COMPENSATION FOR NUCLEAR DAMAGE: COMPARATIVE INSIGHTS FROM INTERNATIONAL NUCLEAR LIABILITY REGIMES AND THE LAWS OF UKRAINE AND SAUDI ARABIA

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ABSTRACT

Background: *International nuclear liability conventions, particularly the Paris Convention of 1960 and the Vienna Convention of 1963, as amended in 1997, establish the principle of exclusive operator liability, under which the licensed nuclear operator bears sole responsibility for compensating for damage resulting from a nuclear incident. In practice, however, this principle encounters significant limitations in situations where operator liability cannot be effectively enforced, such as insolvency, armed conflict, force majeure, or insufficient financial guarantees. These exceptional circumstances raise questions regarding the role of the state in ensuring adequate compensation for victims of nuclear damage.*

Methods: *The study employs a combination of doctrinal, analytical, comparative, descriptive, and statistical research methods. International nuclear liability treaties are examined alongside national legislation, particularly Ukrainian Law No. 2893 of 2001 and Saudi Law No. M/81 of 2018. The comparative method is used to assess how each legal system addresses exceptional state intervention and compensation mechanisms, while descriptive and statistical analyses draw on international practice and comparative data on operator liability limits and financial security arrangements.*

Results and Conclusions: *The analysis demonstrates that both Ukraine and Saudi Arabia recognise the possibility of state intervention when operator-based compensation proves inadequate. However, Ukraine provides a more explicit and structured statutory framework for governmental liability and supplementary compensation mechanisms, whereas Saudi Arabia adopts a more conditional and subsidiary approach. The study concludes that clearer institutional arrangements and designated state compensation mechanisms are necessary, particularly in Saudi Arabia, to enhance alignment with international standards and ensure effective protection of victims of nuclear incidents.*

1 INTRODUCTION

The peaceful use of nuclear energy has become an increasingly significant component of modern energy policy. Its primary application lies in electricity generation, where relatively small quantities of nuclear fuel can produce energy equivalent to thousands of litres of petroleum or tons of coal, while also offering advantages in transportability and long-term energy security.[1] Beyond power generation, nuclear energy is used in maritime transport, industrial processes, scientific research, and, more recently, has been discussed as a potential alternative energy source for certain types of vehicles.[2] These developments reflect a growing global reliance on nuclear technology as part of the transition to diversified and sustainable energy systems.

Despite its economic and technological benefits, nuclear energy entails exceptional risks. Nuclear installations involve radioactive materials and complex reactions that may cause severe harm to individuals, property, and the environment. Such damage is often transboundary, extending beyond the state's territory where the nuclear facility is located. Traditional civil liability rules are inadequate to address these risks, particularly given the scale, latency, and geographic spread of nuclear damage. In response, states have developed a special legal regime for nuclear liability through regional and international agreements designed to ensure prompt, fair, and adequate compensation for victims.

1 Mervat Al-Bardawi, *Legal Framework for Dealing with Nuclear and Radiological Accidents and Compensating for Their Damages* (Dar Al-Nahda Al-Arabiya 2012) [in Arabic].

2 Mahmoud Khairy Bennouna, *International Law and the Use of Nuclear Energy* (Dar Al-Shaab Foundation 1969) 7-8 [in Arabic].

This special regime is primarily embodied in international instruments such as the Paris Convention on Third Party Liability in the Field of Nuclear Energy of 1960, as amended by its subsequent protocols,[3] and the Vienna Convention on Civil Liability for Nuclear Damage of 1963, as amended by the 1997 Protocol.[4] These conventions establish the principle of strict and exclusive operator liability, under which the licensed nuclear operator bears sole responsibility for compensating for nuclear damage. However, practical experience has revealed significant gaps in situations where operator liability cannot be effectively enforced, including cases of insolvency, armed conflict, force majeure, or insufficient financial security. These gaps raise fundamental questions about the state's role as a residual guarantor of compensation.

In Ukraine, the principal legal framework governing nuclear liability is Law No. 2893-III of 2001 on Civil Liability for Nuclear Damage and Its Financial Provision, as last amended in 2024.[5] This framework operates alongside the Law on the Use of Nuclear Energy and Radiation Safety of 1995,[6] which places full responsibility on the nuclear operator as the beneficiary of the facility and defines a broad operational scope covering the planning, construction, operation, decommissioning, and regulation of nuclear activities. The Ukrainian system has been further strengthened by Law No. 1909-IX of 2021 on Insurance,[7] which classifies civil liability insurance for nuclear damage as compulsory and operationalises the financial security obligations imposed on operators. Together, these laws form an integrated system in which substantive liability rules are complemented by mandatory insurance mechanisms, in line with Ukraine's international commitments.[8] Recent reforms, including the adoption of new regulations establishing a Nuclear Insurance Pool, signal a move toward a more robust, institutionally coordinated financial security structure.

3 *Paris Convention on Third Party Liability in the Field of Nuclear Energy: Consolidated Text and Exposé des Motifs* (OECD Publishing 2024) <https://www.oecd-nea.org/jcms/pl_79139/paris-convention-consolidated?preview=true> accessed 10 May 2025.

4 *Vienna Convention on Civil Liability for Nuclear Damage* (text and current status, OECD Publishing 2002) <https://www.iaea.org/topics/nuclear-liability-conventions/vienna-convention-on-civil-liability-for-nuclear-damage> accessed 10 May 2025.

5 Law of Ukraine No 2893-III of 13 December 2001 'On Civil Liability for Nuclear Damage and its Financial Provision' (amended 1 January 2024) [in Ukrainian] <https://zakon.rada.gov.ua/laws/show/en/2893-14?lang=uk#Text> accessed 10 May 2025.

6 Law of Ukraine No 39/95-BP of 8 February 1995 'On the Use of Nuclear Energy and Radiation Safety' (amended 1 January 2025) [in Ukrainian] <https://zakon.rada.gov.ua/laws/show/39/95-%D0%B2%D1%80> accessed 10 May 2025.

7 Law of Ukraine No 1909-IX of 18 November 2021 'On Insurance' (amended 1 January 2025) [in Ukrainian] <https://zakon.rada.gov.ua/laws/show/1909-20#top> accessed 10 May 2025.

8 Resolution of the Cabinet of Ministers of Ukraine No 1276 of 8 October 2025 'On approval of the Regulations on the Nuclear Insurance Pool' [2025] Official Gazette of Ukraine 87/6050 [in Ukrainian].

Saudi Arabia has likewise adopted a specialised framework through Law No. M/81 of 2018 on Civil Liability for Nuclear Damage,[9] which incorporates the Vienna Convention and its 1997 Protocol. The law regulates operator liability, compensation limits, and financial guarantees, reflecting the Kingdom's growing engagement with nuclear energy for peaceful purposes. Nevertheless, the extent and modalities of government responsibility for compensating nuclear damage remain less explicit, particularly in exceptional situations where operator-based compensation proves inadequate.

This study examines the concept of exceptional compensation for nuclear damage, focusing on the circumstances under which the state may intervene to compensate victims when the operator is unable to do so. It analyses the legal bases for such intervention under international nuclear liability conventions and compares their implementation in Ukrainian and Saudi legislation. Particular attention is given to unresolved issues regarding the scope of government liability, the types of compensable damages, the rights of victims' heirs, and the roles of national and supplementary compensation funds.

The significance of this research lies in the unique nature of nuclear damage, characterised by its severity, potential transboundary effects, and delayed manifestation. These features justify the development of an exceptional liability regime based on strict liability and supplementary state intervention. By drawing on comparative international experience, this study seeks to refine compensation mechanisms and advance the emerging legal doctrine of state liability for nuclear damage, particularly within Arab legal scholarship.

2 METHODOLOGY

This study employs a structured combination of doctrinal, analytical, comparative, descriptive, and statistical research methods, each applied to a specific research task to ensure methodological clarity and academic rigour.

The doctrinal method is used to examine the legal texts governing civil liability for nuclear damage. The study systematically analyses the provisions of key international instruments, including the *Paris Convention of 1960*, the *Vienna Convention of 1963 and its 1997 Protocol*, and the *Brussels Convention of 1962*. It also applies doctrinal analysis to national legislation, namely, *Ukrainian Law No. 2893-III (2001)* and its amendments, and *Saudi Law M/No. 81 (2018)*, to clarify the legal concepts, the scope of liability, and the obligations imposed on operators and states.

The analytical method is employed to interpret and break down the legal rules into their constituent elements, with particular focus on the mechanisms of state intervention,

9 Royal Decree of the Kingdom of Saudi Arabia **No** M/81 of 11 April 2018 'Law of Civil Liability for Nuclear Damage' <https://qanoniah.com/en/File/4Kx25lPrOwnKgYGn8R3mJZMQE-Law-of-Civil-Liability-for-Nuclear-Damage> accessed 10 May 2025.

operator liability limits, and compensation pathways. This includes assessing how each legal system addresses exceptional cases such as operator insolvency, exemption scenarios, and claims exceeding liability ceilings.

The study employs a comparative analysis to identify key similarities and differences between Ukrainian, Saudi, and international regimes concerning exceptional state liability and compensation funds. This method allows an assessment of how closely national frameworks align with international standards and the degree to which each system ensures adequate protection for victims of nuclear damage.

The choice of Ukraine and Saudi Arabia reflects two distinct regulatory models: Ukraine represents a jurisdiction with an operational nuclear sector and a mature liability regime aligned with the Vienna Convention, while Saudi Arabia exemplifies an emerging nuclear jurisdiction still developing its legislative architecture. This contrast facilitates the identification of regulatory gaps, strengths, and best practices across systems, without implying any direct legal or institutional relationship between the two states.

The descriptive method is employed when examining practical experiences and illustrative cases from legal practice, outlining the operation of state-backed compensation mechanisms in jurisdictions such as Japan, the United States, Germany, and Switzerland, as well as describing landmark nuclear incidents including Fukushima (2011), Chernobyl (1986), and Three Mile Island (1979).

To strengthen the comparative analysis, the study incorporates a statistical examination of operator liability limits and financial security levels across selected nuclear jurisdictions, drawing on data published by the *OECD Nuclear Energy Agency (NEA)*. These empirical indicators serve as a contextual benchmark for understanding where Ukraine and Saudi Arabia stand relative to other nuclear states in terms of financial protection for victims. The statistical method supports the study's findings by revealing disparities in operator liability ceilings, the presence or absence of state-backed tiers, and the overall maturity of compensation systems.

3 SOURCES REVIEW

Iyad Jadalhaq and Enas Alqodsi (2021)[10] focused on the liability regime for nuclear operators in the United Arab Emirates (UAE) under Federal Decree Law No. 4 of 2012 and the 1997 Vienna Convention. The study compared this regime with general civil liability rules under the UAE Civil Transactions Law to determine the legal nature of nuclear operator liability and assess the protection provided to individuals, property, and

10 Iyad Mohammad Jadalhaq and Enas Mohammad Alqodsi, 'Tort Law Makes a Quantum Leap: A Review of the Civil Liability Regime for Nuclear Operators in UAE Law' (2021) 13(1) Journal of Property, Planning and Environmental Law 17. doi:10.1108/JPPEL-05-2020-0023.

natural resources in the event of a nuclear accident. It also outlined the conditions for entitlement to compensation for nuclear damage. Using a comparative analytical method, the study concluded that specialised liability law offers greater protection to victims of nuclear accidents than general rules, through exceptions introduced by the legislature that narrow the substantive scope of liability. Our study differs by focusing on compensation mechanisms and guarantees of victim recovery, including recourse to insurance companies or the state.

Jiu Liu et al. (2018)[11] examined Chinese legislation on civil liability for nuclear damage, considering the significance of China's civilian nuclear industry in improving environmental sustainability and energy security while also confronting nuclear accident risks. The study highlighted the need for a legal system for nuclear damage compensation and noted that Chinese law contains only two preliminary articles on the subject. It noted that the current legal system lacks coherence, detail, and flexibility. By analysing existing Chinese laws and regulations, the study identified shortcomings and recommended the creation of a comprehensive legal framework for nuclear damage compensation. This framework should include clear objectives, a precise definition of nuclear damage, principles of strict operator liability, appropriate compensation amounts, and a reliable financial guarantee. Our study differs by focusing on exceptional compensation methods, whether through direct government intervention or state-administered compensation funds.

Jonathan Bellamy (2019)[12] analysed the legal framework of operator civil liability for nuclear damage and assessed whether insurance coverage is sufficient to meet such liability. The study emphasised the operator's central role in nuclear programs and the need for adequate insurance commensurate with the operator's legal obligations within the relevant jurisdiction. It also mapped the scope and distribution of new nuclear construction programmes globally, focusing on established nuclear states and new entrants. The study noted that potential civil liabilities arise under both international and national law and compared various international liability regimes (Vienna, Paris, Brussels, and IAEA Conventions). It placed special emphasis on the Brussels Convention and the feasibility of establishing a global liability system, comparing these frameworks with national laws in countries like the United States, China, Russia, India, the United Kingdom, and the UAE. Our study is distinct in its emphasis on exceptional state-based compensation when victims are unable to claim damages from the operator under comparative legal systems.

Marchenko (2024)[13] explored the legal nature and conceptual foundations of civil liability insurance contracts for nuclear damage within the Ukrainian context. His analysis

11 Jiu Liu, Bingyu Liu and Dantao Chen, 'Legislative Study on China's Compensation for Nuclear Damage Liability' (2018) 10(7) Sustainability 2222. doi:10.3390/su10072222.

12 Jonathan Bellamy, 'Civil Liability for Nuclear Damage in Countries Developing Nuclear New Build Programmers' (2019) 12(1) Journal of World Energy Law and Business 108. doi:10.1093/jwelb/jwy036.

13 Mykola Marchenko, 'The Concept and Legal Nature of a Civil Liability Insurance Contract for Nuclear Damage' (2024) 5 New Ukrainian Law *113*. doi:10.51989/NUL.2024.5.16 [in Ukrainian].

highlights the essential role of insurance as a financial guarantee mechanism within the broader nuclear liability regime. This work supports the present study by illustrating how insurance is intended to serve as the primary compensation mechanism, thereby framing the legal and practical limitations that justify exceptional state intervention when insurance coverage is insufficient or inapplicable.

Iryna Les (2024)[14] examined international legal mechanisms governing liability for nuclear damage and assessed their implementation in Ukraine. Her study underscores the challenges Ukraine faces in harmonising domestic law with international standards, particularly in conditions of armed conflict, and identifies gaps in ensuring adequate compensation for victims. Her findings align closely with this study's focus on state liability in exemption scenarios and the need for clearer statutory mechanisms for government-funded compensation.

4 THE EXTENT OF GOVERNMENT LIABILITY FOR NUCLEAR DAMAGE

To contextualise the discussion on the extent of government liability, it is essential to examine how different nuclear jurisdictions' structure operator liability limits and financial security requirements.

The comparative statistical data presented in the table below are not intended to provide a detailed analysis of each listed jurisdiction. Rather, they serve as benchmarking indicators that illustrate the range of liability ceilings and financial models applied internationally, helping situate the Ukrainian and Saudi frameworks within broader international practice.

***Table* 1. Comparative Liability and Financial Security Limits in Selected Nuclear Jurisdictions**[15]

Jurisdiction Category	Country	Operator Liability	Financial Security	Relevance to the Study
High Liability	United States	USD 11.9 billion	USD 300 million insurance + USD 11.6 billion federal indemnification	Demonstrates a strong state-backed tiered model, illustrating how public authorities ensure comprehensive compensation beyond operator limits.

14 Iryna Les, 'International Legal Mechanisms of Liability for Nuclear Damage' (2024) 3 Visegrad Journal on Human Rights 45. doi:10.61345/1339-7915.2024.3.19.

15 OECD Nuclear Energy Agency, *Nuclear Operator Liability Amounts & Financial Security Limits, as of June 2011* (NEA 2011) <https://www.oecd-nea.org/law/2011-table-liability-coverage-limits.pdf> accessed 10 May 2025.

Jurisdiction Category	Country	Operator Liability	Financial Security	Relevance to the Study
	Germany	Unlimited liability	EUR 2.5 billion financial security	Shows implementation of unlimited operator liability; provides a benchmark for expanding liability in Ukraine or Saudi Arabia.
	Japan	Unlimited liability (major reactors)	JPY 120 billion (≈ EUR 920.3 million)	Example of a hybrid system where the operator is unlimited but supported by state-backed financial guarantees, relevant to exceptional state liability.
Medium Liability	France	EUR 91.5 million	Special Drawing Rights 125 million (international tier)	Reflects a traditional Paris–Vienna model combining national and international financial layers.
	Belgium	EUR 297.4 million	EUR 324 million indexed insurance	Demonstrates a balanced liability structure supported by strong insurance requirements.
Lower Liability	Indonesia	IDR 4 trillion (≈ EUR 291.8 million; USD 424 million)	Not specified	Useful for benchmarking; shows mid-range liability compared to European and OECD nuclear states.

The general principle in nuclear damage and its compensation is that the operator is the first and last party responsible, with this liability being exclusively attributed to the operator. However, despite this principle, there are instances in which the state may bear secondary liability. The state may also be held liable for decisions it issues, or even strictly liable for damages resulting from the operation of nuclear installations.[16]

16 Mohamed Abdel Latif, *Encyclopedia of Nuclear Law* (Dar Al-Fikr wa Al-Qanun 2019) [in Arabic].

Before delving into the matter, it is necessary to examine the scope and limits of operator liability under Saudi law. The law sets the operator's liability at 300 million Special Drawing Rights (SDRs) for each nuclear incident. The government may issue operating licenses for some low-risk nuclear installations, requiring the operator to provide financial security amounting to 5 million SDRs.[17]

The Ukrainian law on civil liability for nuclear damage and its financial provision (Law No. 2893-III, adopted on December 13, 2001), Article 6 provides that the operator's liability for nuclear damage is limited to the equivalent of 150 million SDRs in Ukrainian currency per nuclear incident. Furthermore, liability for death is limited to an amount equal to 2,000 times the official non-taxable minimum income at the time of the court ruling. Compensation for health-related damage is limited to 5,000 times the non-taxable minimum income at the time of the court ruling or agreement, without exceeding the actual damage caused.[18]

State intervention in the nuclear field to compensate those harmed by nuclear activity or accident has raised controversy between supporters and opponents. We will review the opinions of both groups.

4.1. In Support of Government Intervention to Compensate for Nuclear Damage

Although the general rule of nuclear civil liability is founded on the principle of exclusive operator responsibility, the question of state liability for compensating nuclear damage has long been the subject of legal and doctrinal debate. During the negotiations leading to the 1997 Protocol amending the Vienna Convention, proposals were advanced to introduce provisions establishing state liability as a substitute for operator liability in exceptional circumstances. Despite the seriousness of these discussions, they did not result in a modification of the Convention's core structure, which continues to prioritise operator liability as the primary rule.[19]

Nevertheless, strong doctrinal arguments support the state's intervention as a compensating authority when operator-based mechanisms prove inadequate. From a practical perspective, the scale of damage caused by nuclear accidents often exceeds the financial capacity of operators and their insurers, rendering state financial resources the only viable means of ensuring effective compensation, as demonstrated by historical catastrophes such as Chernobyl.[20] Beyond financial capacity, state intervention is also justified by the collective

17 Royal Decree of the Kingdom of Saudi Arabia No M/81 of 2018 (n 9) arts 21, 22

18 Law of Ukraine No 2893-III (n 5) art 18.

19 In this sense, Adnan Sarhan, 'Civil Liability of the Nuclear Facility Operator Under UAE Federal Decree-Law No 4 of 2012 on Civil Liability for Nuclear Damage' (2013) 13(2) *Journal of Sharia and Law* 122 [in Arabic].

20 IAEA, *Environmental Consequences of the Chernobyl Accident and Their Remediation: Twenty Years of Experience* (Radiological Assessment Reports Series, IAEA 2006).

nature of the benefits derived from nuclear energy. Nuclear activities serve broad societal interests by contributing to energy security and economic development, with advantages extending to both present and future generations. It is therefore reasonable that society, represented by the state, assumes part of the associated risks.[21]

International nuclear liability instruments, while preserving the principle of operator liability,[22] implicitly acknowledge the necessity of state involvement. The Paris Convention of 1960 envisages state action when the operator is not liable, though it does not specify the precise form of such intervention. The Brussels Supplementary Convention of 1962 further institutionalised this approach by introducing additional compensation tiers funded by the installation state and other contracting states, thereby reinforcing the role of public authorities. Similarly, Article 7(1) of the Vienna Convention obliges the installation state to ensure the availability of compensation by providing public funds where insurance or other financial security proves insufficient, within the established liability limits. Collectively, these mechanisms reflect an understanding of state liability as a supplementary guarantee designed to protect victims rather than to replace operator responsibility.[23]

Finally, analogies may be drawn with other areas of high-risk activity regulated under international law, such as space activities, where states bear international responsibility for damage caused by objects launched under their jurisdiction.[24] Coupled with the state's superior financial solvency and its capacity to mobilise public resources rapidly, these considerations confirm that state intervention plays a critical and complementary role in ensuring effective compensation for nuclear damage, particularly in exceptional circumstances where operator liability cannot be enforced.

In terms of national legislation, most countries include provisions obligating the state to provide compensation when the operator is unable to do so, either due to natural disasters or armed conflict. The state may also be required to compensate for delayed damages if the claim is filed after any statutory limitation period has expired. However, in all these cases, the state's liability is supplementary rather than primary. For instance, Egyptian law mandates government intervention when the operator cannot pay.[25] Article 90 of Law No. 7 of 2010 concerning the regulation of nuclear and radiological activities states: "The operator shall be liable for the execution of judgments issued against him for compensation, even if

21 Mohamed Hussein Abdel Aal, *The Legal System of Civil Nuclear Liability* (Dar Al-Nahda Al-Arabiya 2008) [in Arabic].

22 Ahmad Ibrahim Al-Hayari, 'Guaranteeing Compensation for Damage Resulting from Nuclear Accidents' (2017) 20(4) Kuwait International Law College Journal 117 [in Arabic].

23 Liu, Liu, and Chen (n 11).

24 Wael Abo Taha, 'Nuclear Damage (Definition and Conditions of Occurrence): A Comparative Study between International Conventions and National Legislation' (2016) 13(2) University of Sharjah Journal of Sharia and Law Sciences 89 [in Arabic].

25 Mohamed Amin Youssef Abdel Latif, *State Liability for Environmental Nuclear and Radiological Pollution Damage* (National Center for Legal Publications 2016) [in Arabic].

the compensation exceeds the value of the insurance or guarantee. In the event of proven inability to pay the excess, the state shall cover the shortfall, without prejudice to its right of recourse against the operator."[26]

Similarly, the Ukrainian legislator adopted the same approach in Law No. 2893-III (December 13, 2001), supporting state liability for nuclear damage. *Under Article 10, state intervention is envisaged if the nuclear operator lacks sufficient enforceable assets to satisfy compensation claims, in which case the government may assume responsibility for covering the resulting shortfall.*[27]

This provision can also be interpreted to apply in cases of the operator's bankruptcy. Nevertheless, the procedural requirements outlined in this article must be fulfilled to complete the compensation claim. In our view, the scope of state intervention in compensating nuclear damage should be expanded, particularly in cases where the operator's liability limit is exceeded. This is a critical issue that the Ukrainian legislator has overlooked, and it is important and beneficial to victims to explicitly address such scenarios in legislation.

The Saudi legislator adopted a similar approach in Law No. M/81 of 2018 concerning civil liability for nuclear damage. The law affirms the principle of government intervention in cases where the operator is unable to cover nuclear damage, within the maximum limit of their nuclear civil liability. Article 10 of the Saudi law states: "The amount borne by the government under any of its obligations for the purpose of compensating for nuclear damage involving the liability of more than one operator shall be limited to the difference between the total amounts of liability referred to in Article 8 of the law and the liability amount mentioned in Article 21 of the law, on the basis that each nuclear incident is considered separately, regardless of the number of liable operators." [28]

From the foregoing, it is evident that under Saudi legislation, government liability for nuclear damage compensation is considered supplementary or secondary. The primary liability rests with the operator of the nuclear facility. However, the government may still intervene to provide compensation, even when where the operator's liability is not limited.

4.2. Opposition to Government Intervention in Nuclear Damage Compensation

In contrast, a second strand of legal scholarship rejects the notion that the government should be legally obliged to compensate for nuclear damage. Proponents of this view argue, first, that the hazardous nature of nuclear installations does not, of itself, justify state intervention, since comparable levels of risk exist in other industrial sectors such as explosives manufacturing or gas production, where governments are not expected to

26 Law of the Arab Republic of Egypt No 7 of 2010 'Law Regulating Nuclear and Radiological Activities', art 90 <https://manshurat.org/node/7754> accessed 10 May 2025.

27 Law of Ukraine No 2893-III (n 5) art 10.

28 Royal Decree of the Kingdom of Saudi Arabia No M/81 of 2018 (n 9) arts 10, 21

compensate victims directly. From this perspective, nuclear risk does not warrant exceptional treatment.[29]

It is further argued that the state's role in authorising and supervising nuclear activities cannot serve as a legal basis for compensation obligations. The issuance of licenses and the establishment of safety standards are considered expressions of regulatory authority rather than grounds for assuming financial responsibility after an accident. According to this view, effective regulatory control and preventive oversight are more appropriate responses to nuclear risks than ex post state compensation.[30]

Some scholars acknowledge that governments may provide assistance to victims of large-scale disasters as part of their broader social responsibility. However, they emphasise that such assistance should not be interpreted as creating a binding legal obligation toward affected individuals, but rather as a discretionary policy choice grounded in solidarity. In addition, alternatives to direct state compensation have been proposed, such as imposing special taxes or fees on the nuclear industry proportionate to the financial burdens potentially borne by the state.[31] Nevertheless, this approach remains largely theoretical, lacking sufficient empirical and economic analysis to determine appropriate contribution levels.

Despite these objections, the balance of legal and practical considerations suggests that the arguments supporting state intervention are more persuasive. Given the scale, complexity, and potentially catastrophic consequences of nuclear damage, exclusive reliance on operator-based compensation mechanisms may prove insufficient. Accordingly, it appears necessary to recognise a legal obligation on the state to provide supplementary compensation, subject to a right of recourse against the operator. Such state liability should remain secondary and complementary, operating only within the remaining portion of the maximum liability limit and only after the operator's financial resources have been exhausted.[32] This approach is consistent with both international nuclear liability conventions and prevailing national legislative models, which will be examined in greater detail in the following sections.

4.3. Illustrative Examples from Legal Practice on Compensation for Nuclear Damage

Comparative practice shows that even jurisdictions with strong operator liability frameworks rely on state intervention when damages exceed financial security limits. Ukraine's and Saudi Arabia's legal reforms should, therefore, integrate clear mechanisms

29 Abdel Latif (n 25).

30 Al-Bardawi (n 1) 115.

31 Medhat Saleh Ghaib, 'Insurance for Nuclear Damage' (2016) 3(29) Tikrit University Journal of Law 372 [in Arabic].

32 Al-Shahabi Ibrahim Al-Sharqawi, 'Civil Liability for Nuclear Damage in UAE Law in the Light of Libity's General Rules' (2015) 24(1) Police Thought 67 [in Arabic]; Al-Saghir Mohamed Khader Mahdi, 'Civil Liability of the Nuclear Facility Operator: An Analytical Study under Law No 7 of 2010' (2019) 92(2) Journal of Law and Economics 331. doi:10.21608/mle.2019.110494 [in Arabic].

inspired by international experience. Numerous international experiences in this context demonstrate how nuclear liability rules operate in practice and highlight the importance of clearly defining state intervention in exceptional situations.

Following *the Fukushima Daiichi* accident in 2011, the Japanese operator TEPCO was financially unable to cover the full scope of compensation. Japan's legal regime imposes strict, unlimited liability on nuclear operators, although it is subject to unlimited liability. Consequently, the Japanese government established a state-backed compensation fund exceeding JPY 9 trillion, demonstrating the practical functioning of a tiered operator-state liability model.[33]

Similarly, the *Chernobyl* disaster in 1986, although occurring under the Soviet Union, remains one of the clearest historical examples of how the scale of nuclear damage can far exceed any operator-based liability model. The catastrophic nature of the event revealed the practical impossibility of relying solely on operator responsibility to compensate victims and address long-term environmental harm. Following independence, Ukraine incorporated these lessons into its domestic legal framework through *Law No. 2893-III on Civil Liability for Nuclear Damage*, which expressly provides for state participation in compensation when operator resources are insufficient or unavailable. The law also establishes mechanisms for long-term remediation of health, environmental, and socio-economic impacts, reflecting a recognition that nuclear incidents have consequences that extend over decades. This experience is directly relevant to the present study, as it demonstrates how Ukrainian legislation evolved in response to the inadequacies exposed by the Chernobyl accident and highlights the legal justification for exceptional governmental intervention within Ukraine's current nuclear liability regime.[34]

Another illustrative example is the Three Mile Island (TMI) accident in the United States in 1979, which provides a significant practical example of how a *tiered nuclear liability system* operates in reality. It was the first major incident to test the *Price–Anderson Act*, a legal framework that combines mandatory operator insurance with a substantial federal indemnification layer financed by the U.S. government. Although the reactor meltdown caused limited off-site radiological consequences, more than *USD 70 million* in compensation claims were processed through a hybrid mechanism involving private insurer payouts and federally backed funds. This incident demonstrated the effectiveness of a graduated compensation system, where the operator's primary financial responsibility is complemented by state-supported coverage to ensure timely and adequate compensation for affected individuals. The TMI experience is highly relevant to the present study, as it illustrates how a structured operator, state liability model can function in practice,

33 OECD Nuclear Energy Agency**.** *Japan's Compensation System for Nuclear Damage: As Related to the TEPCO Fukushima Daiichi Nuclear Accident* **(**OECD Publishing **2012) <**https://www.oecd.org/en/publications/japan-s-compensation-system-for-nuclear-damage_9789264992009-en.html**>** accessed 10 May 2025.

34 IAEA (n 20).

providing a useful comparative reference for both Ukraine and Saudi Arabia, whose legal systems lack similarly refined multi-tiered compensation architectures.[35]

Collectively, these examples reveal that in severe nuclear incidents, state participation becomes indispensable even in systems formally based on exclusive operator liability. They, therefore, support this study's conclusion that both Ukraine and Saudi Arabia should adopt clearer statutory mechanisms to regulate governmental intervention when operator-based compensation proves inadequate.

5 CASES OF DIRECT GOVERNMENT INTERVENTION TO COMPENSATE FOR NUCLEAR DAMAGE

A nuclear incident constitutes a serious threat to public safety, environmental integrity, and social stability, thereby necessitating government intervention to mitigate its consequences. Such intervention is grounded in the state's fundamental public responsibilities rather than merely in the fact that nuclear activities are subject to governmental licensing. Licensing alone cannot justify a general obligation of state compensation, as many licensed economic activities do not entail governmental responsibility for resulting damages. Likewise, general notions of disaster relief or humanitarian assistance are insufficient to establish a binding legal obligation on the state to compensate for nuclear damage. Government intervention within the nuclear liability framework is confined to specific, legally defined situations in which operator-based liability mechanisms prove inadequate or inapplicable[36].

5.1. Government Intervention Where Operator-Based Compensation Is Insufficient

The first category of state intervention arises when the nuclear operator, although legally liable for the nuclear incident, is unable to fully compensate victims. This situation may result from the operator's insolvency or bankruptcy, insufficient insurance or financial guarantees, or damage exceeding the operator's statutory liability ceiling. As a commercial entity, the nuclear operator may be subject to national insolvency laws, and international nuclear liability conventions do not regulate such situations in detail. In practice, the operator's assets are often insufficient to cover the full extent of nuclear damage.[37]

In these circumstances, government intervention becomes necessary to ensure effective victim compensation, with the state assuming a guarantor or supplementary role within the framework established by national law. Ukrainian legislation explicitly recognises this

35 Jeffrey C Dobbins, 'Promise, Peril, and Procedure: The Price-Anderson Nuclear Liability Act' (2019) 70(2) Hastings Law Journal 331.

36 Al-Sharqawi (n 32); Mahdi (n 32).

37 Omar Faris, 'The New UAE Bankruptcy System: Incomplete Radical Amendments' (2022) 36 Journal Sharia and Law 162 [in Arabic].

situation, under the Law on the Use of Nuclear Energy and Radiation Safety (1995), which provides for state participation when the operator lacks sufficient financial resources.[38] Similarly, Saudi Law No. M/81 of 2018 contemplates governmental intervention where multiple nuclear facilities are involved in a single incident, and the operator's liability limits are exhausted, allowing the state, subject to its obligations, to cover the excess damage beyond the operator's ceiling.[39]

In this category, state intervention is complementary rather than initial. The operator and its insurer remain the primary guarantors, and governmental funds are mobilised only when these private mechanisms are exhausted. The state may subsequently exercise a right of recourse against the operator, as recognised under Article 7(1) of the 1963 Vienna Convention[40] and Article 3(2) of the 1962 Brussels Convention.[41] Although certain national laws, such as the Saudi framework, characterise such intervention as conditional, international practice demonstrates that political, social, and diplomatic pressures frequently compel host states to intervene to ensure adequate compensation for victims. This model of tiered liability, combining operator responsibility with supplementary public funding, is expressly reflected in the Brussels Convention and the 1997 Convention on Supplementary Compensation for Nuclear Damage.[42]

5.2. Government Intervention Where Operator Liability Is Excluded or Fully Exhausted

The second category of direct government intervention arises when operator liability is excluded or exhausted, and no further compensation can be obtained through private or statutory liability mechanisms. This includes cases where nuclear damage exceeds the combined compensation capacity of all designated tiers, namely the operator, its insurer, state liability ceilings, and any available compensation funds, as well as situations in which the operator is exempted from civil liability under international nuclear liability conventions.[43]

38 Consider also, Agreement between the Ministry of Emergency Situations and Population Protection of Ukraine from the Consequences of the Chernobyl Disaster and the Commission for Atomic Energy and Alternative Energies of the French Republic of 15 October 2010 'On Technical Assistance Aimed at Improving the Conditions for Handling Spent Radioactive Sources and Highly Radioactive Waste in Ukraine' [2010] Official Gazette of Ukraine 82/2913 [in Ukrainian].

39 Royal Decree of the Kingdom of Saudi Arabia No M/81 of 2018 (n 9) arts 11, 21, 22.

40 *Vienna Convention (n 4)* art 7(1).

41 Convention on the Liability of Operators of Nuclear Ship (adopted 25 May 1962) art 3(2) <https://inis.iaea.org/records/jrq3h-rjc68> accessed 10 May 2025.

42 Convention on Supplementary Compensation for Nuclear Damage (adopted 12 September 1997) <https://www.iaea.org/topics/nuclear-liability-conventions/convention-supplementary-compensation-nuclear-damage> accessed 10 May 2025.

43 Adnan Ibrahim Sarhan, *Non-voluntary Sources of Obligation in the UAE Civil Transactions Law According to its Principles of Islamic Jurisprudence* (University Library, Ithraa Publishing and Distribution 2010) 188 [in Arabic].

In the first scenario, where all legally established compensation mechanisms are depleted and residual damage remains uncompensated, the state may be compelled to intervene as a last resort.[44] Such intervention is driven primarily by considerations of public order, social stability, and political accountability rather than by strict nuclear liability rules. It remains discretionary and dependent on the state's financial capacity and socio-economic conditions. Ukrainian law reflects this approach, under Article 12, as amended by Law No. 4717-VI dated May 17, 2012, by permitting compensation for socio-economic risks associated with nuclear and radioactive waste facilities through dedicated state funds administered by executive authorities.[45]

In the second scenario, where the operator is exempted from liability due to circumstances such as armed conflict, civil war, insurrection, or exceptional natural disasters, state intervention becomes mandatory. The exemption of the operator necessarily shifts responsibility to the state, which becomes solely responsible for compensating victims. Where national legislation expressly provides for such state liability, compensation is granted within the liability limits otherwise applicable to the operator. Where domestic law remains silent, as is currently the case under Saudi nuclear legislation, the state remains obligated to intervene on the basis of general public-law principles and its duty to protect individuals and ensure public safety. This residual responsibility is recognised in Article 8(1) of the 1997 Vienna Convention, which allows states to determine compensation levels in accordance with their legal and financial capacity.[46]

It must be emphasised that the exemption of the operator from civil nuclear liability in situations of armed conflict operates strictly within the civil liability regime and does not preclude the application of criminal law or international humanitarian law. As several Ukrainian scholars emphasise, the civil liability rules under *Law No. 2893-III* cease to apply under wartime conditions, yet this does not diminish the relevance of *Article 438 of the Criminal Code of Ukraine*, which incorporates the protections found in *Article 56 of Additional Protocol I*, prohibiting attacks on installations containing dangerous forces, including nuclear power stations.[47]

44 Les (n 14).

45 Law of Ukraine No 39/95-BP (n 6) art 12; Law No 4717-VI of 17 May 2012 'On amendments to the Law of Ukraine "On the Use of Nuclear Energy and Radiation Safety" Regarding the Improvement of the Mechanism of Social Protection of the Population Living in the Territory of the Surveillance Zone' [2012] Official Gazette of Ukraine 45/1736.

46 Artem Nazarko, 'Legal Tug-of-War: The Institutional Challenges of the Domestic Prosecution of War Crimes in Ukraine' (2023) 6 *Analytical and Comparative Jurisprudence 697*. doi:10.24144/2788-6018.2023.06.120.

47 Criminal Code of Ukraine No 2341-III of 5 April 2001 (amended 9 May 2025) art 438 [in Ukrainian] <https://zakon.rada.gov.ua/laws/show/2341-14/ed20250717#Text> accessed 10 May 2025; Protocol Additional to the Geneva Conventions of 12 August 1949, and relating to the Protection of Victims of International Armed Conflicts (Additional Protocol I) (adopted 8 June 1977) UNTS 1125/3, art 56; Law of Ukraine No 2893-III (n 5).

These analyses confirm that while the nuclear operator is relieved of civil liability during hostilities, state responsibility or individual criminal liability under international humanitarian law and Ukrainian criminal law may still arise for acts that endanger nuclear safety in the context of armed aggression.

When the operator is exempted from liability, the government becomes solely responsible to all victims, and such state liability becomes mandatory. This situation arises when one of the exemption grounds recognised under international nuclear liability conventions is present, for example, armed conflict, rebellion, civil war, insurrection, or exceptional natural disasters. In such cases, the operator's exemption triggers the subsidiary liability of the nuclear State, which must compensate for the damage resulting from the nuclear incident. Two scenarios of state intervention can be distinguished.[48]

6 COMPENSATION FUNDS AND OPERATOR POOL MECHANISMS IN COMPARATIVE PERSPECTIVE

In the United States, compensation for nuclear damage is governed by the Atomic Energy Act of 1954,[49] which establishes a two-tier liability system for nuclear operators. The first tier consists of direct operator liability covered through mandatory primary insurance. The second tier requires operators to participate in a collective compensation mechanism, commonly referred to as an operator pool, which functions as a secondary financial layer. Notably, operators are not required to pay advance premiums into this pool; financial contributions are triggered only if a nuclear incident occurs. This structure allows operators to participate without the burden of immobilising capital in advance, while ensuring the availability of substantial compensation resources when needed. Although formally based on private participation, this arrangement reflects indirect state involvement, as it is mandated by federal legislation and supported by a statutory liability framework.[50]

In Switzerland, nuclear damage compensation is addressed through a dedicated public mechanism established under the Swiss Nuclear Law of 2003.[51] Initially, the compensation fund became liable only after the victim's right to claim against the operator had lapsed, provided that the claim was filed within two years from the moment the victim became aware of both the damage and the responsible party, and that a causal link between the nuclear incident and the damage was established. This mechanism was originally known as the Delayed Damage Compensation Fund. Subsequent legislative

48 Al-Shahabi Ibrahim Al-Sharqawi, *Voluntary Sources of Obligation in the UAE Civil Transactions Law* (University Library 2012) 136 [in Arabic].

49 Atomic Energy Act of 1954, 42 USC §§ 2011–2021, 2022-2286i, 2296a-2297h-13.

50 Mohamed Abu Zaid, 'Insights on the Decree Concerning Civil Liability for Nuclear Damage in the UAE' (2013) 3(2) Dubai Judicial Institute Journal 121 [in Arabic].

51 Nuclear Energy Act (NEA) of 21 March 2003 (RS 732.1) <https://www.fedlex.admin.ch/eli/cc/2004/723/en> accessed 10 May 2025.

reforms significantly extended the limitation period, allowing victims to seek compensation from either the operator or the fund for up to thirty years, after which the mechanism was renamed the Nuclear Damage Compensation Fund. These developments reflect a growing recognition of the long-term nature of nuclear harm and the need for durable compensation structures.[52]

Germany offers a further illustration of operator-based collective financial guarantees. Discussions on establishing a nuclear operator pool began in the 1970s, with the objective of securing a financial guarantee of 500 million Deutsche Marks. Under the initial arrangement, operators were required to obtain civil liability insurance coverage of 200 million DM, while the remaining 300 million DM was guaranteed through a pool jointly supported by insurers and nuclear operators. Following successive legislative reforms to the German Atomic Energy Act,[53] culminating in amendments adopted in 2002, the required financial guarantee was significantly increased. In response, German energy companies concluded a civil-law solidarity agreement establishing an operator pool designed to provide the required coverage, currently set at 2.5 billion euros. Contributions to the pool are calculated according to a formula based on each facility's nuclear capacity, ensuring proportional participation among operators.[54]

These examples demonstrate that governments have indirectly supported such compensation mechanisms primarily through legislative mandates and, in some cases, financial backing. In line with this approach, this study supports calls for the establishment of stable compensation funds based on mandatory, cost-free membership expressly provided for by legislation. The implementation of such a model would require amendments to the 1963 Brussels Supplementary Convention and the 1997 Convention on Supplementary Compensation for Nuclear Damage, followed by a corresponding obligation on signatory states, including Saudi Arabia and the United Arab Emirates, to incorporate these provisions into their domestic legal frameworks.

7 CONCLUSIONS

The comparative analysis demonstrates that international conventions, Ukrainian legislation, and Saudi legislation adopt the foundational principle of operator liability, but differ in their implementation and mechanisms for ensuring financial security and state intervention.

Firstly, at the international level, nuclear liability conventions provide a tiered compensation model that envisages state participation when operator liability is

52 Abo Taha (n 24).

53 Law on the Peaceful Use of Nuclear Energy and Protection Against its Dangers (Atomgesetz – AtG) of 23 December 1959 (amended 2025) <https://www.gesetze-im-internet.de/atg/BJNR008140959.html> accessed 10 May 2025.

54 Al-Hayari (n 22).

insufficient, whether due to insolvency, liability caps, or exemptions such as those for armed conflict.

Secondly, in Ukraine, the statutory framework is more developed and structured. Law No. 2893-III and its implementing regulations establish clear mechanisms for financial security, including mandatory insurance and state participation when operator assets are inadequate. Recently, the Government of Ukraine approved new Regulations on the Nuclear Insurance Pool, formalising the status, objectives, membership procedures, and insurance and reinsurance rules for a collective pool of licensed insurers responsible for underwriting nuclear liability coverage. This reform strengthens the financial capacity of the nuclear civil liability insurance system, supports compliance with Ukraine's international obligations, and enhances cooperation between state institutions and private insurers. The updated pool provisions replace earlier regulations and mark a shift toward a more robust financial security structure aligned with international standards.

In contrast, Saudi nuclear legislation recognises the principle of operator liability but offers a more limited framework for state intervention and insurance mechanisms. It does not provide detailed institutional arrangements comparable to Ukraine's model, such as a designated insurance pool or clearly defined rules for collective risk sharing.

Overall, both Ukraine and Saudi Arabia adhere in principle to supplementary state intervention, but the depth and clarity of their frameworks differ. Ukraine's approach is more institutionalised, particularly with the recent establishment of the Nuclear Insurance Pool, while Saudi legislation leaves several operational aspects undefined. This comparative synthesis highlights regulatory gaps and best practices for developing insurance capacity and state-backed mechanisms that ensure effective compensation and alignment with international nuclear liability norms.

The following recommendations are proposed for Ukraine**:**

The Ukrainian legislator is encouraged to establish dedicated compensation funds or to require nuclear operators to participate in appropriately structured compensation pools to strengthen the financial guarantees available to victims of nuclear incidents.

They should consider increasing the operator's liability limit from the current 150 million SDRs to 300 million SDRs. Since most nuclear jurisdictions applying the revised Vienna and Paris Convention regimes adopt operator-liability limits between 250 and 350 million SDRs, this limit will represent a proportionate, internationally consistent, and financially feasible enhancement of Ukraine's civil nuclear liability regime.

For Saudi Arabia, we would like to generalise the following recommendations:

The Saudi legislator is encouraged to expressly incorporate the exemption scenarios listed in the 1997 Vienna Convention, such as civil war, armed conflict, hostile acts, and civil unrest, so that state liability is clearly activated when operator liability is excluded under these circumstances.

A clear mechanism should be established for claiming state-funded compensation. This should include the designation of the competent authority responsible for disbursing compensation (for example, the Ministry of Finance or the National Atomic Energy Agency) together with explicit guarantees ensuring the timely and effective payment of compensation whenever operator-based compensation is unavailable or insufficient.

Finally, for all emerging nuclear jurisdictions, including Saudi Arabia**,** participation in national or international nuclear compensation funds should be mandated, with clear statutory provisions governing the percentage and structure of state contributions. Such funds are essential, as nuclear incidents may generate compensation demands far exceeding the financial capacity of both operators and their insurers.

REFERENCES

1. Abdel Aal MH, *The Legal System of Civil Nuclear Liability* (Dar Al-Nahda Al-Arabiya 2008) [in Arabic]
2. Abdel Latif M, *Encyclopedia of Nuclear Law* (Dar Al-Fikr wa Al-Qanun 2019) [in Arabic]
3. Abdel Latif MAY, *State Liability for Environmental Nuclear and Radiological Pollution Damage* (National Center for Legal Publications 2016) [in Arabic]
4. Abo Taha W, 'Nuclear Damage (Definition and Conditions of Occurrence): A Comparative Study Between International Conventions and National Legislation' (2016) 13(2) University of Sharjah Journal of Sharia and Law Sciences 89 [in Arabic]
5. Abu Zaid M, 'Insights on the Decree Concerning Civil Liability for Nuclear Damage in the UAE' (2013) 3(2) Dubai Judicial Institute Journal 121 [in Arabic]
6. Al-Bardawi M, *Legal Framework for Dealing with Nuclear and Radiological Accidents and Compensating for Their Damages* (Dar Al-Nahda Al-Arabiya 2012) [in Arabic]
7. Al-Hayari AI, 'Guaranteeing Compensation for Damage Resulting from Nuclear Accidents' (2017) 20(4) Kuwait International Law College Journal 117 [in Arabic]
8. Al-Sharqawi ASI, 'Civil Liability for Nuclear Damage in UAE Law in the Light of Libity's General Rules' (2015) 24(1) Police Thought 67 [in Arabic]
9. Al-Sharqawi ASI, *Voluntary Sources of Obligation in the UAE Civil Transactions Law* (University Library 2012) [in Arabic]
10. Bellamy J, 'Civil Liability for Nuclear Damage in Countries Developing Nuclear New Build Programmers' (2019) 12(1) Journal of World Energy Law and Business 108. doi:10.1093/jwelb/jwy036
11. Bennouna MK, *International Law and the Use of Nuclear Energy* (Dar Al-Shaab Foundation 1969) [in Arabic]

12. Dobbins JC, 'Promise, Peril, and Procedure: The Price-Anderson Nuclear Liability Act' (2019) 70(2) Hastings Law Journal 331

13. Faris O, 'The New UAE Bankruptcy System: Incomplete Radical Amendments' (2022) 36 Journal Sharia and Law 143 [in Arabic]

14. Ghaib MS, 'Insurance for Nuclear Damage' (2016) 3(29) Tikrit University Journal of Law 372 [in Arabic]

15. Jadalhaq IM and Alqodsi EM, 'Tort Law Makes a Quantum Leap: A Review of the Civil Liability Regime for Nuclear Operators in UAE Law' (2021) 13(1) Journal of Property, Planning and Environmental Law 17. doi:10.1108/JPPEL-05-2020-0023

16. Les I, '*International Legal Mechanisms of Liability for Nuclear Damage*' (2024) 3 Visegrad Journal on Human Rights 45. doi:10.61345/1339-7915.2024.3.19

17. Liu J, Liu B and Chen D, 'Legislative Study on China's Compensation for Nuclear Damage Liability' (2018) 10(7) Sustainability 2222. doi:10.3390/su10072222

18. Mahdi ASMK, 'Civil Liability of the Nuclear Facility Operator: An Analytical Study under Law No 7 of 2010' (2019) 92(2) Journal of Law and Economics 331. doi:10.21608/mle.2019.110494 [in Arabic]

19. Marchenko M, 'The Concept and Legal Nature of a Civil Liability Insurance Contract for Nuclear Damage' (2024) 5 New Ukrainian Law 113. doi:10.51989/NUL.2024.5.16 [in Ukrainian]

20. Nazarko A, 'Legal Tug-of-War: The Institutional Challenges of the Domestic Prosecution of War Crimes in Ukraine' (2023) 6 Analytical and Comparative Jurisprudence 697. doi:10.24144/2788-6018.2023.06.120

21. Sarhan A, 'Civil Liability of the Nuclear Facility Operator Under UAE Federal Decree-Law No 4 of 2012 on Civil Liability for Nuclear Damage' (2013) 13(2) Journal of Sharia and Law 122 [in Arabic]

22. Sarhan AI, *Non-voluntary Sources of Obligation in the UAE Civil Transactions Law According to its Principles of Islamic Jurisprudence* (University Library, Ithraa Publishing and Distribution 2010) [in Arabic]

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АНОТАЦІЯ УКРАЇНСЬКОЮ МОВОЮ

Оглядова стаття

ВИНЯТКОВА КОМПЕНСАЦІЯ ЗА ЯДЕРНУ ШКОДУ: ПОРІВНЯЛЬНИЙ АНАЛІЗ МІЖНАРОДНИХ РЕЖИМІВ ВІДПОВІДАЛЬНОСТІ ЗА ЯДЕРНУ ЕНЕРГІЮ З ЗАКОНОДАВСТВОМ УКРАЇНИ ТА САУДІВСЬКОЇ АРАВІЇ

Саліх Лухайбі*, Маамар Бентрія, Аднан Ібрагім Сархан та Мурад Бенсегір

АНОТАЦІЯ

Вступ. *Міжнародні конвенції про ядерну безпеку, зокрема Паризька конвенція 1960 року та Віденська конвенція 1963 року, з поправками 1997 року, встановлюють принцип виключної відповідальності оператора, згідно з яким ліцензований оператор ядерної енергетики несе виключну відповідальність за компенсацію шкоди, завданої внаслідок ядерних інцидентів. Однак на практиці цей принцип стикається зі значними обмеженнями в ситуаціях, коли відповідальність оператора не може бути ефективно забезпечена, таких як неплатоспроможність, збройний конфлікт, форс-мажор або недостатні фінансові гарантії. Ці виняткові обставини порушують питання щодо ролі держави у забезпеченні належної компенсації жертвам ядерної шкоди.*

Методи. *У дослідженні використовується поєднання доктринальних, аналітичних, порівняльних, описових та статистичних методів дослідження. Міжнародні договори про ядерну відповідальність розглядаються разом із національним законодавством, зокрема Законом України № 2893 від 2001 року та Законом Саудівської Аравії № M/81 від 2018 року. Порівняльний метод використовується для оцінки того, як кожна правова система розглядає виключні втручання держави та механізми компенсації, тоді як описовий та статистичний аналіз спирається на міжнародну практику та порівняльні дані щодо обмежень відповідальності оператора та механізмів забезпечення фінансових зобов'язань.*

Результати та висновки. *Аналіз демонструє, що як Україна, так і Саудівська Аравія визнають можливість державного втручання, коли компенсація з боку оператора виявляється недостатньою. Однак Україна забезпечує більш чітку та структуровану законодавчу базу щодо відповідальності, яку несе держава, та додаткових механізмів компенсації, тоді як Саудівська Аравія застосовує більш умовний та субсидіарний підхід. У дослідженні було зроблено висновок, що для покращення відповідності міжнародним стандартам та забезпечення ефективного захисту жертв ядерних інцидентів необхідні більш чіткі інституційні механізми та визначені державні механізми компенсації, особливо в Саудівській Аравії.*

Ключові слова. *Виняткова відповідальність держави; ядерна шкода; відповідальність оператора; компенсаційні фонди; міжнародні конвенції про ядерну безпеку; законодавство України; законодавство Саудівської Аравії.*

ABSTRACT IN ARABIC

مقالة مراجعة

التعويض الاستثنائي عن الأضرار النووية: دراسة تحليلية مقارنة للاتفاقيات الدولية والتشريعين الأوكراني والسعودي

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الملخص

الخلفية: تُرسّخ اتفاقيات المسؤولية النووية الدولية، ولا سيما اتفاقية باريس لعام 1960 واتفاقية فيينا لعام 1963 بصيغتها المعدّلة عام 1997، مبدأ المسؤولية الحصرية للمشغّل النووي، والذي يقضي بأن **يتحمل** المشغّل النووي المرخّص وحده المسؤولية الكاملة عن تعويض الأضرار الناشئة عن أي حادث نووي. غير **أن** التطبيق العملي لهذا المبدأ يواجه قيوداً جوهرية في الحالات التي يتعذر فيها إنفاذ مسؤولية المشغّل بفعالية، مثل حالات الإعسار المالي، أو النزاعات المسلحة، أو القوة القاهرة، أو عدم كفاية الضمانات المالية. وتثير هذه الظروف الاستثنائية تساؤلات قانونية مهمة حول دور الدولة في **ضمان** توفير تعويض كافٍ لضحايا الأضرار النووية.

المنهجية: تعتمد الدراسة على مزيج من المناهج البحثية الفقهية والتحليلية والمقارنة والوصفية والإحصائية. وتم تحليل اتفاقيات المسؤولية النووية الدولية جنباً إلى جنب مع التشريعات الوطنية، ولا سيما **القانون** الأوكراني رقم 2893 لسنة 2001، **والقانون** السعودي رقم م/81 لسنة 2018. واستُخدم المنهج **المقارن** لتقييم كيفية معالجة كل نظام قانوني لمسائل تدخل الدولة الاستثنائي وآليات التعويض، في حين استند التحليل الوصفي والإحصائي إلى الممارسات الدولية والبيانات المقارنة المتعلقة بحدود مسؤولية المشغّلين وترتيبات **الضمان** المالي.

النتائج والاستنتاجات: تُظهر نتائج التحليل **أن** كلاً من أوكرانيا والمملكة العربية السعودية **تعترفان** بإمكانية تدخل الدولة عندما يثبت عدم كفاية التعويض القائم على مسؤولية المشغّل. غير **أن** أوكرانيا توفر إطاراً تشريعياً أكثر وضوحاً وتنظيماً لمسؤولية الدولة وآليات التعويض التكميلي، في حين تتبنى المملكة العربية السعودية نهجاً أكثر حزماً في هذا **الشأن**. وتخلص الدراسة إلى **أن** وجود ترتيبات مؤسسية أكثر وضوحاً، وآليات تعويض حكومية محددة، يُعد أمراً ضرورياً، ولا سيما في المملكة العربية السعودية؛ لتعزيز التوافق مع المعايير الدولية **وضمان** حماية فعّالة لضحايا الحوادث النووية.