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Legal Framework for International Liability in Peaceful Nuclear Energy

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Abstract

In this study, we have examined the legal basis for international responsibility regarding damages resulting from the use of nuclear energy for peaceful purposes. Initially, we clarified the concept of nuclear energy in jurisprudence, international law, and domestic law. We then discussed various applications of nuclear energy for peaceful purposes. Subsequently, we highlighted the significant risks that arise from the use of nuclear energy for peaceful purposes on human health and the environment. Towards the conclusion of the study, we delved into the topic of international responsibility. We began by defining international responsibility, followed by an exploration of the legal foundation for international responsibility in this study. We deliberated on several theories, ranging from the theory of error to that of absolute responsibility. The researcher contends that the most accurate and widely accepted stance, fitting for this situation, is to adopt the theory of absolute responsibility. Accordingly, the state is held accountable for all damages resulting from its utilization of nuclear energy for peaceful purposes, irrespective of whether it violates an international legal norm or not.

Keywords: Nuclear Energy, Peaceful Purposes, International Responsibility, Nuclear Radiation, Absolute Responsibility.

Introduction

Nuclear energy is a double-edged sword in the realm of international affairs. It can either be wielded as an illegitimate weapon in violation of international law or harnessed for peaceful purposes, offering substantial economic, environmental, and developmental benefits. Our focus in this study lies on the use of nuclear energy for peaceful objectives.

The utilization of nuclear energy for peaceful purposes represents an opportunity for significant progress across various domains. Technological advancements in the field of nuclear energy have expanded its potential applications for peaceful uses, including electricity generation, nuclear medicine, and scientific research. However, the positive impact of nuclear energy on the international stage goes hand in hand with an increased responsibility for the states utilizing this technology. Nuclear energy carries substantial risks if not managed with care and accountability, underscoring the importance of delineating international responsibility to mitigate risks and address challenges stemming from its peaceful use.

The evolution of international relations and scientific progress across diverse fields has cast its shadows on international responsibility. This has necessitated collective efforts to establish new legal frameworks to facilitate appropriate dispute resolution and problem-solving among nations. In accordance with traditional theory, international responsibility was contingent upon a violation of international law or obligations by a legal entity under international law.

Due to technological progress in various spheres of life, international legislation has turned toward prohibiting actions that could cause harm to others, even if such actions are considered lawful under international law. Considering the potential damages that may arise from the peaceful use of nuclear energy, including long-term effects, legal scholars have advocated for the development of international responsibility rules that align with its legal nature.

Early on, states recognized that customary principles such as good neighborliness and the principle of non-abuse of rights, which govern international responsibility in international law, do not adequately account for the unique risks of nuclear activity. Consequently, they endeavored to establish a series of agreements and international treaties incorporating specialized rules for nuclear international responsibility. As an initial step toward shaping rules specific to nuclear responsibility, it has become imperative to seek legal foundations for compensating nuclear damages based on non-traditional responsibility, influenced by civil liability in private law.

This study aims to raise awareness about the risks and damages stemming from the peaceful use of nuclear energy. Furthermore, it seeks to contribute to the development of international responsibility rules that align with the nature of nuclear energy when utilized for peaceful purposes.

Therefore, in this study, the researcher will elucidate the concept of nuclear energy and its various applications for peaceful purposes. Subsequently, the challenges and risks associated with the peaceful use of nuclear energy will be examined. Finally, the researcher will delve into the legal foundation of international responsibility for damages.

Methodology

Given the specificity of the research topic, the researcher adopted a descriptive approach to delineate the study's problem and the mechanism to address its associated effects. Additionally, the analytical method was employed to scrutinize international agreements, treaties, opinions of international jurisprudence, and other related texts pertinent to the subject under investigation. This was undertaken to arrive at a mechanism that defines the legal foundation of international responsibility for damages resulting from the peaceful use of nuclear energy.

Result and Discussion

Concept of Nuclear Energy and its Peaceful Applications

Nuclear energy is considered one of the fundamental pillars driving industrial, technological, and scientific advancement in our present era. It has become a defining characteristic of our time, to the extent that some refer to the current age as the "Energy Era." Energy consumption has become a measure of societal progress and development, and nuclear energy stands as a vital form of energy upon which advanced nations rely in various aspects of life. This is due to the numerous advantages nuclear energy offers. In the following sections, we will elucidate the concept of nuclear energy and subsequently outline its primary applications for peaceful purposes.

1. Concept of Nuclear Energy

The concept of nuclear energy can be defined through several perspectives, some of which are scientifically grounded, while others stem from the domestic laws of certain nations. Moreover, international law and jurisprudence have also contributed to shaping these definitions.

Nuclear energy is a form of energy obtained through specific interactions involving certain elements, such as uranium. These interactions include the splitting of a heavy atomic nucleus into two or more lighter elements, a process known as nuclear fission, or the fusion of two light nuclei to form a heavier nucleus, referred

to as nuclear fusion. These nuclear changes release an immense amount of energy, manifesting as heat energy and radiation energy (Sattar Jabbar Ali, 2009).

In Jordanian law, nuclear energy is defined as the energy generated from nuclear reactions, whether fission or fusion, or any other nuclear reactions. The resulting energy is harnessed for various purposes, including electricity generation, water desalination, production of radioactive isotopes for medical, industrial, agricultural applications, and other uses (Jordanian Nuclear Energy Law, 2007).

In U.S. law, the term "nuclear energy" refers to the energy derived from nuclear reactions, whether in the context of peaceful or military applications. Nuclear energy involves the transformation of atomic nuclei through nuclear reactions, such as nuclear fission or fusion, which release a tremendous amount of energy (The US Atomic Energy,1954).

International treaties and agreements have also incorporated the term "nuclear energy" or "atomic energy." For example, the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) of 1968 mentions atomic energy in its preamble and Article IV.

The foundational statute of the International Atomic Energy Agency (IAEA) includes the term "atomic energy," aligning with its name. This term is present in Article I and Article II of the statute.

Nuclear law encompasses the rules regulating activities related to fissile materials, ionizing radiation, exposure to natural sources of radiation, and protection against the risks associated with peaceful uses of nuclear energy and radioactive materials. It also prohibits non-peaceful uses of nuclear energy through legal frameworks established for this purpose (Ahmed Rashad Salam, 2018).

In light of the foregoing, nuclear energy can be defined as a set of interactions between specific atoms, whether through fusion or fission, resulting in a massive release of energy that can be harnessed for various purposes.

2. Utilization of Nuclear Energy for Peaceful Purposes

Nuclear energy stands as one of the paramount renewable energy sources with peaceful applications. The use of nuclear energy for peaceful purposes has become an urgent necessity across various realms of life. Starting from electricity generation and extending to agricultural and industrial production, as well as healthcare services and other domains, nuclear energy emerges as a pivotal driver of societal advancement in our contemporary era. The following elucidates the principal applications of nuclear energy for peaceful purposes.

2.1. Medical Services

Radioactive isotopes find significant utilization in the realm of public health, contributing to disease diagnosis and treatment. In diagnostic applications, these isotopes are employed to detect cancer at early stages, precisely locate tumors,

and identify cardiovascular diseases. They are also integral to meticulous blood analyses (Marian K. Barkoub,1995). In the field of healthcare, these isotopes are harnessed for treating various forms of cancer by subjecting affected cells to nuclear radiation. The choice of radioactive isotopes for treatment varies based on the nature and type of cancer. For instance, phosphorus-32 is employed for treating skin, bone, and blood cancers. However, a challenge during atomic radiation treatment is the potential damage to healthy cells, which divide rapidly within the human body. Such effects manifest swiftly on cells like hair and skin (Abd al-Wahhab Muhammad Abd al-Wahhab,1994).

Furthermore, nuclear energy finds applicability in sterilization processes. Scientists have successfully employed nuclear energy in medical sterilization by disintegrating microorganisms and eradicating them through controlled radiation at normal temperatures. This approach preserves temperature-sensitive medical equipment. Additionally, nuclear energy has contributed to sterilization procedures for organ transplantation, cultivating organs for patients, and irradiating them for sterilization purposes (Hamid Rashid Al-Qadi,1997).

2.2. Agricultural Domain

Nuclear energy plays a pivotal role in agriculture, aiding in pest control and eradicating agricultural nuisances that plague crops, leading to destruction. Nuclear energy optimizes fertilizer utilization for plants by utilizing radiation to determine the precise fertilizer quantity required for optimal growth and enhanced fruit yield. Furthermore, radioactive isotopes bolster plant resistance to diseases and agricultural pests (Raqib Muhammad Jassem, 2018).

2.3. Industrial Sector

The industrial sector consumes a substantial amount of energy, particularly in systems that rely on heating through hot water or steam for industrial processes. In this regard, nuclear energy's integration into such processes can enhance the industrial sector, minimizing reliance on other energy sources like fuel and gas (IAEA, 2017).

Nuclear energy also serves to measure gas density, employing alpha and beta radiation for tasks like measuring metal sheet thickness and determining the hydrogen-to-carbon ratio. Moreover, nuclear radiation is employed to enhance rubber, increasing its flexibility, transparency, and purging it of carcinogenic materials like zinc. This plays a pivotal role in radiation vulcanization, an alternative to conventional vulcanization processes (Bashar Mahdi Al-Asadi, 2016).

Furthermore, nuclear energy is employed to measure petroleum flow velocity in pipelines. Radioactive isotopes are injected into pipelines, allowing for the tracking of isotopes' passage. This method aids in determining the level of distillation byproducts within closed petroleum tanks, distinguishing between

petroleum products within pipelines, and identifying pipeline damage points (Charles Forsberg, 2010).

2.4. Nuclear Energy Utilization in Electricity Generation

Nuclear energy can significantly contribute to the generation of vast quantities of electricity, enabling a reduction in reliance on fossil fuels for electricity generation. This, in turn, leads to a decrease in environmentally harmful emissions, particularly carbon dioxide. Additionally, electricity generation through nuclear energy is comparatively more cost-effective than fossil fuels. Furthermore, both nuclear power plants and hydroelectric power plants entail lower health risks in comparison to fossil fuels (H. Holger Rogner, et al., 2022).

Based on the foregoing, it can be concluded that electricity generation through nuclear energy leads to a reduction in the carbon footprint of the energy sector. Moreover, it provides substantial amounts of electrical energy to various sectors within nations, thereby fostering sustainable development. By providing environmentally-friendly electricity around the clock, nuclear energy supports industrial and agricultural sectors, contributing to the attainment of sustainable development goals (Emirates Nuclear Energy Corporation, n.d.).

3. Challenges and Risks Associated with the Peaceful Use of Nuclear Energy

Despite the benefits and advantages of peaceful nuclear energy, it is accompanied by numerous risks and potential harms that could affect humans, water, air, soil, and the entire environment. Consequently, nuclear energy could transform into a deadly weapon, capable of causing widespread devastation if mishandled by nations. The harm caused by nuclear energy primarily stems from the radiation emitted during its usage. Herein, we shall outline some of the risks and effects of nuclear radiation.

Nuclear radiation is defined as energy or particles released from the atomic nucleus due to a state of instability, either manifesting as moving energy in the form of electromagnetic waves or high-speed particles. This radiation has the ability to alter the natural state of atoms in substances, rendering them charged with electrical charges (ionization). Moreover, nuclear radiation is defined as an increase in the rate of radioactive activity beyond scientifically permissible limits, affecting the components of nature such as water, air, soil, and endangering human life (Ali Saidan, 2008).

Radioactive pollution is defined as the harm leading to loss of life, personal injury, property damage, or any harm caused to us due to radioactive, toxic, or explosive properties, or any other hazardous properties related to radioactive products, waste, or nuclear materials resulting from them (Monad Fateha, 2014).

There are two types of nuclear radiation: natural nuclear radiation, which is beyond human control and responsibility, such as cosmic rays and radiation from the Earth's crust; and the other type, industrial nuclear radiation, resulting from human manufacturing and development. Humans bear responsibility for the consequences of this type of damage, including nuclear reactors and nuclear testing (Ali Saedan, 2012).

3.1. The Impact of Nuclear Radiation on Human Beings

Radiation contamination represents one of the most significant hazards that humans may face, particularly when exposed directly. Its effects can manifest in the short, medium, and long term. These effects vary depending on whether the radiation source is external or internal. If the source is external to the human body, the impact differs based on the type of radiation exposure. For instance, exposure to alpha radiation results in severe and extremely hazardous damage, whereas exposure to gamma radiation leads to more superficial and minor harm. Internal radiation occurs when a radioactive source is ingested and is located within the human body. The impact varies based on the type of radioactive source ingested. For example, if the source is strontium radioactive, it affects the skeletal structure and spinal cord, causing damage to the production of white and red blood cells (Charles –André chener ,1965).

Radiation doses may not immediately exhibit their effects; they could become apparent after a long period of time. The harmful effects of radiation can extend to future generations. Atomic pollution is known to occur due to errors in the use of tools or machinery in nuclear facilities, resulting in the release of radioactive waste or emissions from machinery and transport powered by nuclear energy. It can also result from the transportation of radioactive materials from one location to another. Radiological contamination knows no geographical or political boundaries. Thus, the impact of a nuclear accident will not be confined to individuals in the vicinity of the incident but could extend to distant geographical areas (Samir Muhammad Fadel,1972).

In addition to the physical risks posed by nuclear radiation, there are psychological health risks for humans due to nuclear radiation and nuclear accidents. For instance, the Chernobyl reactor disaster had significant psychological effects on the affected population. Even individuals who experienced relatively minor radiation exposure suffered from psychological health issues. This was because the aftermath of the accident was accompanied by insufficient and conflicting information, which disrupted the normal lives of the population (Michael H. McGovern،Jaya Tiwari, n.d.).

3.2. The Environmental Impact of Nuclear Energy

Nuclear radiation affects all components of the environment, including water, air, soil, and biodiversity. The following outlines the damages caused by nuclear radiation on these components:

3.2.1. Biodiversity

While various organisms on Earth have historically lived in environments exposed to natural radiation sources, recent times have introduced the exposure of these organisms to radiation from artificial sources, such as dust from nuclear testing and radiation emitted by nuclear waste. Radioactive nuclear waste poses the most significant threat to biodiversity (United Nations Scientific Report on the Effects of Atomic Radiation at the Fifty-sixth Session,2008).

The global crisis of nuclear waste disposal has arisen, with some countries disposing of this waste beyond their geographical borders by transporting it aboard specialized vessels and disposing of it in deep waters. Astonishingly, these countries have often misrepresented the nature of the waste. For example, ashes from the city of Philadelphia were sent to Haiti labeled as fertilizer, and to Guinea as brick-making materials. Advanced countries have exploited less developed nations, disposing of their nuclear waste under deceitful names, in direct violation of the truth (Journal of Ijtihad for Legal and Economic Studies, 2012).

3.2.2. Air

Certain gases or particles of radioactive materials, often carried in water droplets in the atmosphere, can lead to air pollution. Factors influencing air pollution levels include the presence of an ice layer on the ground, variations in dust and smoke ratios, weather conditions, wind direction, wind speed, and atmospheric instability. All these elements impact the degree of radiological pollution in the air. Airborne radioactive contamination is a change in the physical composition of the air due to the introduction of naturally or artificially radioactive elements beyond permissible limits. This poses a threat to human health and other environmental components (Journal of Ijtihad for Legal and Economic Studies,2012).

The 1986 Chernobyl reactor incident is regarded as the worst nuclear disaster in human history, resulting in significant environmental contamination. The explosion released approximately 7 tons of radioactive material into vast areas that extended far beyond the geographic boundaries of the Soviet Union, increasing radiological contamination by about 400 times compared to the contamination from the Hiroshima bomb (Bawadi Mustafa ,2020).

3.2.3. The water

Burying nuclear waste in water bodies has significant detrimental effects on aquatic life. Nuclear radiation increases ultraviolet sunlight reaching water bodies due to the depletion of the ozone layer. This leads to water pollution, causing the death of many marine organisms. Moreover, human health is at risk from consuming contaminated aquatic organisms or contaminated water, potentially leading to the spread of diseases like cholera and hepatitis. International society has been prompted to hold numerous conferences to protect marine environments, such as the Stockholm Conference of 1972, which recommended establishing an international network of water pollution monitoring stations. Water contamination with radioactive materials can also occur through the mixing of rainwater with dust containing radioactive substances (Muhammad Khamis Al-Zawka, 2007).

Additionally, the radioactive activity of groundwater primarily results from contact with radioactive substances in the soil. The impact of radioactive substances on water varies depending on the surrounding conditions, such as the physical and chemical properties of the radioactive materials and the water itself (Mamdouh Hamed Attia, Sahar Mostafa Hafez, 2008).

3.2.4. Soil

Soil is a vital renewable natural resource, comparable in importance to water and air. Soil pollution occurs when foreign radioactive materials are introduced, leading to changes in its physical and biological properties. This can result in the destruction of living organisms that rely on the soil. Radioactively contaminated soil can result from the unauthorized burial of radioactive waste, causing the leakage of radioactive substances (Belbali Yamina, 2017).

Radioactive pollution of soil is particularly dangerous, as radiation cannot be smelled, seen, or felt. Plants absorb these unseen radiations from the organic matter they feed on, leading to their destruction. For instance, bombs dropped on Iraq resulted in widespread destruction of soil, causing the nation to face tomato and grain shortages after once enjoying self-sufficiency (Bawadi Mustafa,2020).

4. International Responsibility for Damages Resulting from the Peaceful Use of Nuclear Energy

Despite the significant benefits of nuclear energy used for peaceful purposes and all the precautions taken during the operation of nuclear facilities,

such energy still poses numerous damages and risks, as previously explained. In addition to nuclear accidents that may occur despite necessary precautions and preventive measures, international law has established compensation for damages caused by the use of nuclear energy for peaceful purposes.

The initial steps towards regulating international responsibility for nuclear damages were taken in the 1960 Paris Agreement. Later, the Vienna Convention on Civil Liability for Nuclear Damage was reached, modified in 1997. The following will clarify the concept of civil liability, followed by an explanation of the legal basis for liability for damages resulting from the use of nuclear energy for peaceful purposes.

4.1. The Concept of International Responsibility

Legal scholar Charles Rousseau defined international responsibility as a legal framework whereby a state that commits an unlawful act under international law is obligated to compensate the affected state for the resulting harm it faces.

Jurist Hans Kelsen described it as the principle that establishes the obligation to provide compensation for any violation of international law committed by a responsible state that causes harm (Said Abu Attia, 2001).

Anzilotii, another jurist, defined it as a legal relationship that arises from a state's violation of an international commitment, leading to harm to another state, which is then obligated to compensate the latter for the incurred damage (Laidi Abdelkader, 2018). Others have defined it as the legal situation that arises when a state or individual, subject to international law, commits an act that warrants reprimand according to principles and rules applied in the international community (Laidi Abdelkader, 2018).

The International Law Commission, in its final draft on state responsibility for unlawful acts presented to the General Assembly in 2001, defined international responsibility as being committed by a state if the action or omission attributed to the state under international law constitutes a breach of international obligations (Fatija Baya, 2016).

The International Court of Justice, in its 1970 judgment on the Barcelona Traction, Light and Power Company case, outlined the objective conditions for accepting Belgium's claim, stating: "It was within the rights of the Belgian government to file a complaint if it could prove that one of its rights had been violated by any international obligation arising from a treaty or any legal rule (the International Court of Justice,1948-1991). "

The previous definitions neglected that there are cases where the state’s actions cause harm to others even though these acts are legitimate in their origin, just as the previous definitions limited international responsibility to states only despite the existence of other persons of public international law such as international organizations, so we can define international responsibility It is a legal

situation that arises as a result of an act or omission by a person of public international law that results in harm to others, regardless of whether this act is legitimate or not.

4.2. The Legal Basis for International Responsibility for Damages Resulting from the Peaceful Use of Nuclear Energy

States bear several obligations as the primary subjects of general international law. These obligations may be customary or contractual. A state is required to fulfill these obligations in good faith, as stipulated by Article 26 of the Vienna Convention on the Law of Treaties 1969. In this context, while utilizing nuclear energy for peaceful purposes, a state must adhere to its international obligations related to nuclear safety, environmental preservation, and other commitments imposed by treaties and customary international law.

However, situations may arise where a state's use of nuclear energy for peaceful purposes causes harm to others. This harm could result from negligence, intentional misconduct, or an unlawful act committed by the state. It could also be a natural consequence of using nuclear energy for peaceful purposes despite taking all necessary and agreed-upon measures and precautions. In such cases, what is the legal basis that can be relied upon to hold a state internationally accountable for the damages caused by its use of nuclear energy for peaceful purposes?

4.2.1. Fault as the Basis for International Responsibility

This theory posits that a state is held responsible when it intentionally or negligently commits an act that results in harm. Jurist Grozio proposed two scenarios for fault in this theory: a state fails to take necessary measures to prevent the act, or after the act occurs, the state fails to take appropriate actions to penalize those responsible.

However, this theory has faced criticism. A significant portion of international legal scholars believe that fault cannot be the sole basis for establishing international responsibility. The crux of international responsibility lies not merely in the presence or absence of fault, but in the violation of international obligations. Scholar Rousseau argued that this theory relies on psychological elements that are difficult to analyze and measure, as it blends the concept of violating the law with the concept of fault, which cannot be straightforwardly transferred to international law (Bin Amer Al-Tunisi, 1995).

4.2.2. Abuse of Right Theory

The abuse of right theory is one of the most renowned theories in the field of international responsibility and is relevant to our study. A substantial portion of international legal scholars believes that the principle of not abusing one's right is a recognized principle of general international law among civilized nations. This principle has transitioned from private law to public law, and the determination of cases constituting an abuse of right is left to international agreements, judicial decisions, and international arbitration (Omar Saadallah,2005).

The "Trail Smelter" arbitration case between the United States and Canada regarding Canada's international responsibility for harmful emissions from a smelting plant is a notable example in this context. The arbitration decision deemed Canada internationally responsible because it violated an international obligation to protect other states from harm originating within its territory. This constitutes an abuse of its right (United Nations Reports of International Arbitration Awards,1965).

The principle of not abusing the right is mentioned in various international agreements, such as the 1961 Draft Articles on State Responsibility, the Stockholm Declaration of the United Nations Conference on the Human Environment in 1972, and the United Nations Convention on the Law of the Sea in 1982.

The right of a state to use nuclear energy for peaceful purposes is an established right without dispute. Advanced states in nuclear technology are even obligated to provide financial and technical support to other states wishing to enter the field of nuclear energy, as emphasized by all international agreements and documents. As a result, states have full freedom in using nuclear energy for peaceful purposes, according to international standards and norms (Samir Muhammad Fadel,1976).

Opinions differ among legal scholars regarding whether abuse of right theory should be the basis for establishing state responsibility for their use of nuclear energy for peaceful purposes and the resulting harm to others. Some believe that international responsibility in this domain should be founded on the absolute liability theory, which will be explained later. On the other hand, some, like legal scholar "Garcia Amado," argue that the abuse of right theory is the only viable approach to addressing problems arising from the use of nuclear energy (Hussein Fouzari,2002).

4.2.3. Absolute Liability "Risk Theory"

Absolute liability, as defined by the "Risk Theory," is the responsibility borne by a state due to damages arising from legitimate

activities that inherently carry substantial risks, regardless of the presence of fault, negligence, or error on the part of the state or the operator of the hazardous facility. The foundation of this theory is a causal relationship linking the incident to individuals under international law. When a hazardous project is undertaken that results in harm, the state is held liable (Anas Al-Marzouqi,2018).

Consequently, this theory excludes unlawful acts from the elements of international responsibility. This means that the act itself is legitimate, but it poses a high risk. If harm results from it, the focus isn't on the presence of fault or negligence on the part of the state, but rather on the direct compensation of damages based on absolute liability. The aggrieved party isn't required to prove the state's negligence or arbitrariness (Muammar Ratib Muhammad Abdel Hafez ,2008).

Hence, it's widely agreed that the presence of fault, an unlawful international act, or a violation of international obligations isn't necessary for international responsibility to arise. As long as the state's activity leads to harm to others, it bears the responsibility for rectifying the damage. Therefore, this theory embodies the principle of "getting the benefits and assuming the risks," meaning that just as the state benefits from and profits from its activities, it must also bear the consequences and risks of these activities, even if they are lawful (Ahmed Abdel Karim Salam ,2009).

The foundation of this theory is found in the following agreements, which were concluded as a result of efforts by specialized international organizations in the field of nuclear energy, such as the International Atomic Energy Agency (IAEA) (Samir Muhammad Fadel,1976):

a. Paris Convention on Civil Liability for Nuclear Damage 1960.
b. The Brussels Supplementary Convention to the Paris Convention (1963).
c. The Vienna Convention on Civil Liability for Nuclear Damage (1963).
d. The Brussels Convention Relating to Civil Liability in the Field of Maritime Carriage of Nuclear Material (1963).

International jurisprudence has differed regarding the status of the Risk Theory as the basis for establishing international responsibility for damages resulting from the peaceful use of nuclear energy. Supporters and opponents exist. Among the theory's advocates is legal scholar Georges Scelle, who argued that the concept of absolute liability begins with harm and concludes with compensation, without any necessary link between the starting point and the endpoint. This means that compensation for damages doesn't depend on proving the state's fault (Muammar Ratib Muhammad Abd al-Hafiz,2008). On the other hand, legal scholar "Reglade" sees the

Risk Theory as holding the state responsible for any act that causes harm to an interest recognized and protected by international law, irrespective of any individual's wrongdoing or violation of international law (Samir Muhammad Fadel,1976).

Opponents of the theory argue that just because certain domestic legal systems have stipulated certain legal rules, it doesn't necessarily mean these should be transferred to international law. The adoption of such rules in international law relies on international practices and the acceptance of the parties. Moreover, the theory evaluates responsibility based on an absolute guarantee to the aggrieved party, regardless of the state's fault. This doesn't align with the current conditions in the international community, which still largely base international responsibility on state fault (Jaafar Abdel Salam, 1987).

The stance of international courts is evident in the Trail Smelter case, where international arbitration ordered the Canadian government to compensate the US government for damages caused by emissions from the smelter. This acknowledgment from the court underscores the establishment of international responsibility on the basis of the Risk Theory (Ahmed Khaled Nasser, 2010).

The international agreements also reflect the reliance on the Risk Theory as a foundation for compensating damages resulting from the peaceful use of nuclear energy. This is evident in the aforementioned agreements, such as the Brussels Convention, which explicitly places absolute responsibility on the operator of the nuclear facility in the case of damage resulting from a nuclear incident during maritime transport of nuclear materials (Susan Moawad Ghoneim, 2011).

In conclusion, the Risk Theory is the most suitable basis for international responsibility for damages arising from the peaceful use of nuclear energy. This is particularly relevant as such use is not prohibited by any international legal rule. Therefore, this theory accommodates the needs of contemporary international life. It enjoys significant support from legal scholars and international courts, making it a viable solution for some issues arising from inherently lawful actions that nonetheless cause harm to others, such as peaceful nuclear tests or the transportation of chemical or radioactive waste.

Conclusion

Nuclear energy possesses immense power that entices advanced nations to employ it for peaceful purposes, given its numerous benefits across various aspects of life. This energy can result from the fission or fusion of atomic nuclei and is harnessed by states to generate electricity, enhance agricultural and livestock

production, and treat various diseases, all contributing to sustainable development. Despite the substantial advantages of nuclear energy, its applications for peaceful purposes carry serious medium and long-term risks to human health and the environment. Consequently, the international community has been compelled to establish a legal foundation for compensating damages resulting from inherently lawful actions (the peaceful use of nuclear energy) that extend beyond geographical borders.

International jurisprudence has offered several theories to serve as the basis for international responsibility in this study. The first theory, based on fault, was universally rejected by legal scholars due to the absence of a violation of international law. The second theory, arbitrary exercise of rights, divided legal scholars between proponents and opponents regarding its suitability as the foundation for international responsibility in this study. The final theory, absolute liability, found unanimous consensus among the majority of international legal scholars, was enshrined in international agreements, and has been upheld by international courts. According to this theory, a state is held responsible for its actions that cause harm, regardless of whether the act violates international law.

The research recommends raising awareness about the risks of nuclear radiation at both the local and international levels, especially for those residing near nuclear facilities. It also calls for intensified international efforts to unify and develop the rules of international responsibility for damages resulting from the peaceful use of nuclear energy. The focus should be on the legal basis of this responsibility. The researcher contends that absolute state responsibility for damages caused by its use of nuclear energy for peaceful purposes is the most suitable approach, as it is inherently legitimate and compliant with international law. This theory effectively addresses the unique situation of nuclear energy, which is lawful in origin but can inadvertently cause irreparable and undeniable harm.***

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