

6-3-2022

Threat of Nuclear Terrorism: The Developing Nuclear Security Regime

Muhammed Ali Alkış
Hacettepe University

Follow this and additional works at: <https://trace.tennessee.edu/ijns>



Part of the [Defense and Security Studies Commons](#), and the [International Relations Commons](#)

Recommended Citation

Alkış, Muhammed Ali (2022) "Threat of Nuclear Terrorism: The Developing Nuclear Security Regime," *International Journal of Nuclear Security*. Vol. 7: No. 1, Article 17.

<https://doi.org/10.7290/ijns07e3t1>

Available at: <https://trace.tennessee.edu/ijns/vol7/iss1/17>

This article is brought to you freely and openly by Volunteer, Open-access, Library-hosted Journals (VOL Journals), published in partnership with The University of Tennessee (UT) University Libraries. This article has been accepted for inclusion in *International Journal of Nuclear Security* by an authorized editor. For more information, please visit <https://trace.tennessee.edu/ijns>.

Threat of Nuclear Terrorism: The Developing Nuclear Security Regime

Cover Page Footnote

I would like to express my deepest appreciation to Assoc. Prof. Sebnem Udum without whom I would not understand the importance of nuclear security. I also thank my wife Nesibe and my daughter Ipek for their continuing support and love.

Threat of Nuclear Terrorism: The Developing Nuclear Security Regime

Muhammed Ali Alkış
Hacettepe University

Abstract

Terrorism has always been a part of human history in various forms. However, it had not been such a clear and present danger until the 9/11 attacks. After the 9/11 attacks, terrorism evolved into a new kind of terrorism only aiming to change a system with sensational attacks that cause so many deaths. Today, it poses a threat in the form of nuclear terrorism. Its potential rate of lethality could not be compared with any other forms of terrorism if terrorists managed to detonate an intact nuclear weapon or an improvised nuclear device. In addition, the psychological effects of sabotaging a nuclear facility or exploding a “dirty bomb” would be much more powerful than any other form of terrorism. In response, states have already started to cooperate through various international responses, collectively known as nuclear security. But, nuclear security is still developing and seems not yet strong enough to effectively cope with the threat of nuclear terrorism. On the other hand, there is the international nuclear nonproliferation regime based on the three pillars of nuclear nonproliferation, the peaceful use of nuclear energy, and nuclear disarmament. However, its scope is limited to address threats stemming from traditional state actors such as nuclear war and proliferation. Nonetheless, this regime still offers a useful base for nuclear security to develop a more effective framework for international responses to the threat of nuclear terrorism. The inspiration and guidance of the international nuclear nonproliferation regime would lead to more effective nuclear security.

Note from the publisher: This manuscript is based on a Master’s thesis published by the author at Hacettepe University.

Keywords: nuclear terrorism, nuclear security, nuclear nonproliferation regime, nuclear weapon, improvised nuclear device, nuclear facility, dirty bomb

I. Introduction

Since 9/11, there has been global concern about the threat of nuclear terrorism and a terrorist’s ability to cause mass casualties without the use of a traditional weapon of mass destruction (WMD) [1]. As terrorist

groups have already shown their willingness to cause maximum damage, it would not be far-fetched for them to attempt nuclear terrorism. Unfortunately, state-level-oriented efforts, such as nuclear deterrence, might not be effective in preventing these terrorist groups [2].

Although the proliferation of nuclear weapons is a relatively new problem, nuclear nonproliferation efforts date back to the Cold War era [2]. After the Cuban Missile Crisis in 1962, there was a need to push for stability and minimize the possibility of nuclear weapon proliferation and nuclear war. Therefore, concerns stemming from the possibility of the proliferation of nuclear capabilities and the possibility of a nuclear war resulted in the first steps of nuclear nonproliferation efforts, which have evolved into the international nuclear nonproliferation regime, hereafter referred to as “the regime.”

The cornerstone of the regime is the Treaty on the Non-Proliferation of Nuclear Weapons (Nuclear Nonproliferation Treaty, NPT) which entered into force in 1970 [3]. According to the NPT, there are five nations recognized as nuclear weapon states (NWS). The NPT differentiates between NWS and non-nuclear-weapon states (NNWS) that agree not to manufacture, transfer, or seek assistance in acquiring nuclear weapons or nuclear explosive devices either directly or indirectly. While the NPT limits the number of states that own nuclear weapons, it supports the peaceful use of nuclear energy for all parties to the Treaty.

Also, as a component of the regime, the International Atomic Energy Agency (IAEA) is “the world’s central intergovernmental forum,” which concentrates on scientific and technical cooperation concerning nuclear science and technology [4]. The IAEA serves for the safe and secure use of nuclear technology and its peaceful use, which supplements international peace and security. Similarly, covering all multilateral arms control and disarmament efforts, the Conference on Disarmament (CD) provides a base for treaties such as the Comprehensive Nuclear-Test-Ban Treaty (CTBT) and Fissile Material Cut-off Treaty (FMCT).

Components of the regime, the Zangger Committee (ZAC) and the Nuclear Suppliers Group (NSG), supplement the regime by providing guidelines to ensure the peaceful use of nuclear materials. From a similar point, Nuclear-Weapon-Free Zones (NWFZ) reinforce the regime by creating a regional cooperation environment carrying global values of the regime and being consistent with the NPT Article VII. The regime is based on three pillars: nuclear nonproliferation, the peaceful use of nuclear energy, and nuclear disarmament.

On the other hand, nuclear security is a newly developing concept that emerged as a response to nuclear terrorism. By definition, nuclear security is “the prevention and detection of, and response to, theft, sabotage, unauthorized access, illegal transfer or other malicious acts involving nuclear material, other radioactive substances or their associated facilities.” On the other hand, nuclear safety is the prevention of “the broader issue of harm to humans (or the environment) from radiation, whatever the cause” [5].

After the 9/11 attacks, nuclear security has become increasingly important. Especially with former U.S. President Obama’s Prague speech in 2009, nuclear security has gained more publicity. He highlighted the threat of nuclear terrorism by pointing out black market trade, the spread of nuclear technology, and terrorists’ determination to acquire nuclear weapons or nuclear weapons explosive devices [6]. As an act of nuclear terrorism, terrorists might try to cause the dissemination of radioactive materials through radiological devices or cause a release of these materials by sabotaging nuclear facilities. Even worse, they might try to detonate an intact nuclear weapon or an improvised nuclear device (IND) [7]. Although most terrorist groups might have different motivations and intentions regarding the acts of nuclear terrorism, their capability to do so heavily depends on technical and organizational skills and their financial resources. Due to the threat, states have started to look for ways of cooperation for nuclear

security as a response to the threat through different agreements and initiatives, such as UN Security Resolutions, conventions, initiatives, and summits.

Yet, nuclear security efforts are in a stage of development and need comprehensive attention on the threat of nuclear terrorism. In the case of a successful nuclear terrorist act such as the detonation of an IND, a major city could turn into radioactive debris, and an IND could cause thousands of deaths and injuries. So, even the lowest probability of a nuclear terrorist act requires the utmost attention to take nuclear security steps [8].

In this vein, this article is an attempt to briefly compare the fully developed international nuclear nonproliferation regime and the developing international nuclear security regime with a comparative approach by making use of regime theory to come up with a solution to strengthen the latter in the midst of the growing threat of nuclear terrorism. Accordingly, this article briefly defines both regimes and then evaluates the different elements of the nuclear security regime. After explaining both regimes, this article uses a comparative approach to highlight how to benefit from a developed regime by underlying the essential aspects of the regime. It is imperative to note that while the nonproliferation regime is based on a realistic and hegemonic mechanism for nuclear nonproliferation, the international nuclear security regime is based on the sovereign responsibility of the individual state. With this point of view, this article offers a way forward by integrating these aspects into the nuclear security regime in a relevant manner.

II. International Regimes

Before moving forward with explaining the regime, it is helpful to explain why international regimes are essential. International regimes “constrain state behavior by formalizing the expectations of each party to an agreement where there is a shared interest” in a given international issue area. As a result, international regimes enhance cooperative habits, oversee compliance, and sanction defectors. So, international regimes encourage “trust, continuity, and stability in a world of ungoverned anarchy” [9]. From this vein, “as a highly developed example,” the international nuclear nonproliferation regime carries importance for studies concerning not only nuclear issues but also any international regime.

A. International Nuclear Nonproliferation Regime

The international nuclear nonproliferation regime is a universal framework consisting of international agreements and organizations that prevent the spread of nuclear weapons and strengthen the peaceful use of nuclear energy, arms control, and disarmament process. In 1963, U.S. President John F. Kennedy predicted that during the 1970s, there would be fifteen to twenty-five states possessing nuclear weapons [10]. As a result of such concerns, there have been several international mechanisms to promote the peaceful use of nuclear energy, prevent nuclear proliferation, and provide a basis for nuclear disarmament, all of which led to the establishment of the regime.

The regime consists of multilateral measures such as international export control, physical security for nuclear material and weapons, border security to detect illicit transfers, detection and interdiction measures, and arms control, and the NPT constitutes the cornerstone of the regime [11]. Even though there is a misleading inclination to associate the regime only with the NPT, the norms of nonproliferation have evolved thanks to the implementation of the NPT and other relevant agreements and organizations, such as enforcement and verification activities of the IAEA, individual states, and the UN Security Council.

The regime reflects its importance through its success and evolutionary structure [12]. The regime serves to guide political actions surrounding nuclear issues. By this time, it has created principles, norms, rules, and decision-making procedures according to which states shape their expectations.

As a part of global governance, the regime covers other related varieties of global governance, which consist of international rules and laws, international mechanisms including IGOs and NGOs, international norms and groups, and public-private partnerships. As a result, international rules and laws, based on multilateral treaties and customary practices such as the NPT and the CTBT (and possibly the FMCT in the future), play a vital role in the regime's structure. These kinds of laws are essential as "the negotiation process now involves all affected countries." In addition, regional treaties of NWFZs supplement these rules and laws, strengthening the regime. Similarly, as an IGO, the IAEA provides a mechanism for states to shape international debate on nuclear issues, monitors compliance, and creates norms of behavior. These international norms are "shared expectations or understandings regarding standards of appropriate behaviour." In a few words, all of these rules, laws, international mechanisms, norms, and groups such as the CD, the ZAC, and the NSG are linked under the international nuclear nonproliferation regime. This is why the regime and international regimes, in general, are "key types of global governance" [13].

In addition to its general importance, the regime has a specific value for this article's structure. This regime was a response to the threat stemming from a traditional war perspective because it grew out of necessity and peaked during the Cuban Missile Crisis in 1962 to limit the increasing risk of nuclear war between states and nuclear proliferation. It has proved its success by limiting the number of NWS and preventing a nuclear war up to now, as well as by increasing its number of members and strength after the end of the Cold War. However, war has become something new that takes state and non-state actors into the equation. The security problem in the post-Cold War period is dominated by the threat of terrorism. As a practical example of an international regime, the regime could inspire nuclear security to become more effective in preventing the threat of nuclear terrorism. This reasoning is based on the premises of conventional war, where a state that may not be as responsible as a great power might decide to use nuclear weapons.

B. Nuclear Security Regime

As a response to the threat of nuclear terrorism, states concluded several agreements and launched various initiatives. These responses have intensified with the effects of the 9/11 attacks and have achieved some success. From this point, the existing nuclear security regime consists of international rules and laws based on the UN Security Council resolutions, treaties, and conventions, such as UN Security Council Resolution 1373 and 1540, the CPPNM and its 2005 Amendment, Nuclear Terrorism Convention, and SUA Convention and its 2005 Protocol. It also consists of groups, such as Proliferation Security Initiative and Global Initiative to Combat Nuclear Terrorism and Nuclear Security Summits, and norms and nuclear security culture-building networks, such as the World Institute for Nuclear Security (WINS), the International Nuclear Security Education Network (INSEN), the Nuclear Threat Initiative (NTI), and the International Nuclear Security Forum (INSF).

1. UN Security Council Resolution 1373

Immediately after 9/11, the UN Security Council concentrated its efforts on counter-terrorism. As a result, on September 28, 2001, the UN Security Council adopted Resolution 1373, which created proactive legislation to coordinate international efforts and counter international terrorism that proved to have no limits on the level of lethality and destruction. Resolution 1373 (2001) calls for member states to prevent and suppress the financing of terrorist acts, refrain from assisting terrorism, enhance cooperation against terrorism, and become parties to international conventions and protocols (Paragraphs 1-3). The resolution highlights the connection between international terrorism and transnational illegal activities, including the movement of CBRN materials. It obliges states to cooperate "to strengthen a global response to this serious challenge and threat to international security" (Paragraph 4) [14].

2. UN Security Council Resolution 1540

The UN Security Council advanced its counter-terrorism policies by adopting Resolution 1540 to pressure all states to enforce the following provisions. Resolution 1540 (2004) calls for member states to “refrain from providing any form of support to non-state actors that attempt to develop, acquire, manufacture, possess, transport, transfer or use nuclear, chemical or biological weapons and their means of delivery” (Paragraph 1). It also requires member states to review their domestic practices and laws to prohibit any non-state actor from conducting any acts mentioned in Paragraph 1. (Paragraph 2). Further, it calls for a member state to take effective measures to take domestic control on related materials in production, use, storage, and transport, to take effective border and export controls to prevent the illicit trafficking of such items and to prevent WMD proliferation (Paragraph 3). Like Resolution 1373, it establishes a committee, the 1540 Committee and Expert Group, to monitor compliance with the resolution (Paragraph 4). The resolution also obliges member states to promote the effectiveness of multilateral treaties related to WMD proliferation (Paragraph 8) [15].

Like the previous resolution, this resolution is also binding for member states. However, unlike Resolution 1373, it has direct obligations concerning WMD proliferation. Thus, this constitutes an important step taken towards the nonproliferation pillar of the regime [16].

Nonetheless, despite UN Security Council Resolutions 1373 and 1540 bringing binding obligations to states, the implementation, especially of Resolution 1540, has been slow for several reasons, including shortcomings in the capacity to implement and political unwillingness [17].

3. Convention on the Physical Protection of Nuclear Material (CPPNM) and 2005 Amendment

As a result of the need for cooperation between states to effectively protect nuclear materials, in 1977, the Director-General of the IAEA prepared a draft convention and sent it to all IAEA members. After more than two-year-long negotiations on the draft convention concerning the physical protection of nuclear materials, the Convention on the Physical Protection of Nuclear Material was adopted in 1979, opened for signature in 1980, and entered into force in 1987 under the auspices of the IAEA.

The convention states that it applies to nuclear materials used for peaceful purposes during international transport (Article 2) and calls for parties of the convention to take necessary steps to ensure the protection of nuclear materials during international transport or during the process of international transport (Article 3). It obliges parties not to export, import, or allow transit passage within their territories without receiving assurances to protect nuclear materials during international transport (Article 4). Also, it requires parties to cooperate in the recovery and protection of stolen or altered nuclear materials (Article 5). The convention also calls for parties to criminalize acts concerning unlawful possession, use, or threat of use of nuclear materials (Article 7) [18].

The CPPNM has a limited scope of international transport, as the opposing states supported the domestic regulation of physical nuclear protection during the negotiations. However, the threat of nuclear terrorism led to the amendment process to expand the scope of the convention, which is the only legally binding agreement on the physical protection of nuclear materials [19].

The Amendment to the Convention on the Physical Protection of Nuclear Material (2005) replaces the name of the convention by adding “and Nuclear Facilities.” Thus, the new title is “Convention on the Physical Protection of Nuclear Material and Nuclear Facilities” (Paragraph 1). The amendment also replaces Article 2 of the convention by expanding its application to both nuclear materials used for peaceful purposes in use, storage, and transport to nuclear facilities; and by affirming the responsibility of a state for physical protection within that state (Paragraph 5). It requires parties to take the necessary steps

to protect nuclear facilities against sabotage and minimize its possible consequences (Paragraph 6). Similarly, it obliges parties to criminalize the acts directed against nuclear facilities (Paragraph 9) [20].

Apart from the Convention on the Physical Protection of Nuclear Material and its amendment, the IAEA provides legally non-binding recommendations as a booklet titled *The Physical Protection of Nuclear Material and Nuclear Facilities* (INFCIRC/225) [21]. There are several revisions to the booklet; the first revision was published in 1972 [21]. The most recent was published in 2011 under the IAEA Nuclear Security Series with the title of *Nuclear Security Recommendations on Physical Protection of Nuclear Material and Nuclear Facilities* (INFCIRC/225/Revision 5) [21]. The recommendations aim to guide states towards physical security for nuclear materials and nuclear facilities.

Similarly, there is also a Code of Conduct on the Safety and Security of Radioactive Sources, which are also not-legally-binding recommendations published in 2004 [22]. It applies to all radioactive sources except the nuclear materials defined in the CPPNM. The recommendations aim to achieve and maintain the safety and security of radioactive materials, prevent the unlawful acquisition of radioactive materials, and minimize radiological consequences [23].

4. International Convention for the Suppression of Acts of Nuclear Terrorism (ICSANT)

In 1996, UN General Assembly Resolution 51/210 established an ad hoc committee aimed to prepare a convention for the suppression of international terrorism, including a convention directly addressing nuclear terrorism (Paragraph 9). After nearly a decade of negotiations on the draft convention, the International Convention for the Suppression of Acts of Nuclear Terrorism (the Nuclear Terrorism Convention) was opened for signature in 2005. According to the convention, any person commits an offence if that person unlawfully and intentionally possesses, uses, or threatens to use radioactive material with an intent to cause damage, damages facilities with the same intent, or attempts to do so; or participates in, organizes, or contributes to such actions (Article 2). The convention requires parties to criminalize these offences in their national law (Article 5). It calls for parties to take practicable measures to prevent preparations of such offences in their territories; to prohibit the activities of people, groups, or organizations that contribute to the perpetration of such offences; and to exchange information under the national laws and inform the UN and the IAEA (Article 7). Also, it urges parties to take measures to protect radioactive material consistent with the recommendation of the IAEA (Article 8) [24].

The convention has a key role in establishing nuclear security as an international norm. While it defines acts of nuclear terrorism, it also promotes cooperation among states and the IAEA to prevent such acts [16]. Similarly, Paige Willan states that the convention has two aims: to criminalize the possession or use of nuclear materials for acts of terrorism and enhance cooperation among states to prevent nuclear terrorism. Further, she adds that the convention creates norms for cooperation, including information sharing, investigation, and prevention of such offences [25]. However, it is pointed out that even though the Nuclear Terrorism Convention promotes cooperation among states and with the IAEA and the UN, it is limited cooperation because neither the IAEA nor the UN has been entrusted with the role of monitoring compliance [26].

5. Convention for the Suppression of Unlawful Acts Against the Safety of Maritime Navigation and 2005 Protocol (SUA Convention)

As a result of concerns related to the safety of ships and the security of crew and passengers, the International Maritime Organization was asked to prepare a convention concerning the unlawful acts directed towards maritime navigation. These concerns led to the Convention for the Suppression of Unlawful Acts Against the Safety of Maritime Navigation (SUA Convention), which was adopted in 1988

and entered into force in 1992. The convention aims to criminalize unlawful acts against maritime navigation, including the seizure of ships by force, performing violence against crew or passengers, damaging ships, or attempting or threatening to do so [27].

However, there was a growing need for a revision in the SUA Convention after 9/11, which led to the addition of the Protocol of 2005 to the Convention for the Suppression of Unlawful Acts against the Safety of Maritime Navigation [28]. According to this protocol, the following is accepted as an offense: use of radioactive materials or biologic, chemical, and nuclear (BCN) weapons against or on a ship; discharge of these from a ship; use of a ship for intentional damage; or transporting these and fissionable materials and equipment knowingly to be used in or to contribute to BCN weapon or nuclear explosive activity (Article 4, Paragraph 5) [29].

The 2005 Protocol carries importance for nonproliferation efforts as mere transport of WMD, or related materials and technology, is considered an offense. It promotes the regime by not applying its provisions on a shipment of fissile materials, which are regulated with the IAEA safeguards. In other words, provisions are not applied to the shipment of fissile materials from or to an NPT member state. While it prevents illicit shipments and other malicious acts, it does not prevent the peaceful use of nuclear energy through exports and imports [26].

6. Proliferation Security Initiative (PSI)

The Proliferation Security Initiative (PSI) is a voluntary partnership that launched in 2003, and it addresses the threat of WMD proliferation. It provides a platform for states to coordinate their activities for counter-proliferation. Being complementary to the existing nonproliferation efforts and having one hundred and five participant states, PSI aims to prevent illicit trafficking of WMD, their delivery means, and related materials by coordinating the national capabilities of participant states. Participant states commit to taking the measures that are necessary for their national facilities to not be used for such trafficking, and PSI participant states endorse the PSI Statement of Interdiction Principles, thus creating an effective and coordinated base for preventing WMD trafficking [30].

Despite its non-binding structure, the PSI is seen as successful. There have been more than two dozen WMD-related interceptions, among which the BBC China was transporting centrifuge parts to Libya through the A.Q. Khan network. Thus, its flexible and voluntary structure is complementary to formal mechanisms [31].

Nonetheless, there are similar concerns for the PSI as the NSS process. Because the initiative is seen as a component of U.S. dominance by some states, some states also question the legality of interdiction actions conducted through the PSI rather than under the UN structure. As a result, they hesitate to participate [16].

7. Global Initiative to Combat Nuclear Terrorism (GICNT)

The Global Initiative to Combat Nuclear Terrorism (GICNT) is a voluntary partnership established in 2006. Having 86 member states and five international organizations as observers, the GICNT aims to integrate available resources to enhance the global framework to combat nuclear terrorism. It also aims to bring together nonproliferation, counter-proliferation, and counter-terrorism experience and expertise to constitute a ground for states to share information in a non-binding environment [32].

It has an agenda called a Statement of Principles comprised of objectives consistent with the UN Security Council 1373 and 1540, the CPPNM, and the Nuclear Terrorism Convention [32]. This is why it creates no new international norms, organizations, or procedures. Its voluntary structure creates flexibility for

states, while its basis in international agreements contributes to its legal standing. As a result, it is possible to state, for the GICNT, that it reinforces international responses and develops an informal environment to sustain them [33].

8. Nuclear Security Summits

Former U.S. President Obama highlighted the importance of nuclear security in his Prague speech and stated that "... we should start by having a Global Summit on Nuclear Security" [6]. As he stated, four Nuclear Security Summits (NSS) have focused on the threat of nuclear terrorism and enhancing and promoting existing mechanisms to prevent it [34].

The first NSS was held in Washington, D.C. between April 12-13 in 2010 with 47 heads of state and three international organizations participating. These leaders agreed to provide effective security of nuclear materials, decrease weapons-usable nuclear materials in civilian sectors, and strengthen nuclear security. The summit issued a communique and Washington Work Plan that guided enhancing nuclear security by ratifying or implementing treaties or resolutions concerning nuclear security, thereby increasing assistance and cooperation between states and the IAEA [35].

With the participation of six new states and one new international organization along with the previous 47 states and three international organizations, the Seoul 2012 Summit had three main agenda topics: cooperative measures to counter nuclear terrorism threats, protection of nuclear materials and nuclear facilities, and prevention of illicit nuclear material trafficking. Building upon the previous communique and work plan, this summit also issued its communique in which it promoted minimization of the use of highly enriched uranium (HEU), ratification of Amendment to the CPPNM, and improving the security of nuclear materials [36].

With the same number of participants as the previous one, the Hague 2014 Summit focused primarily on increasing the cooperation between states and the nuclear industry and enhancing global nuclear security measures [37]. In the communique of the final summit, which was again held in Washington, D.C. in 2016, the overall process of NNSs was evaluated, and the importance of nuclear security was reiterated [38].

It is believed that NSSs strengthened nuclear security by promoting international mechanisms and minimizing the use and amount of HEU and plutonium. The NSSs played a key role in securing the necessary number of ratifications for the Amendment to the CPPNM, which entered into force and was announced at the last summit. With the commitments given in summits and assistance of the IAEA, there were several accomplishments, such as breaking the reliance on HEU in research reactor and medical isotope production. Also, "several tonnes of HEU was repatriated to countries of origin and down blended into LEU, several regions became completely free of HEU" [39].

There are some criticisms towards the NNS process, although there will be no new summits in this format. Even though the main criticism is on commitments made during the summits, some of which have not been accomplished, the summit process is also criticized for focusing mainly on civil nuclear materials, which constitute approximately 17% of the whole of weapons-usable nuclear materials. There was a sense in some states during the NSS process that the U.S. Government was using the threat of nuclear terrorism to preserve and advance its strategic position [39].

9. NGOs and Civil Society Efforts

The World Institute for Nuclear Security (WINS) is an international non-governmental organization launched in 2008 whose objective is to improve nuclear security globally by sharing information and practices through an international forum. It also aims to develop effective security systems and promote training for nuclear security professionals. As it is stated in the WINS Governing Statute, WINS's mission

is to provide “an international forum for those accountable for nuclear security to share and promote the implementation of best security practices” [40].

WINS works in a close relationship with the IAEA, and focuses on improving the security and physical protection of radioactive materials and nuclear facilities by sharing information and best practices. Accordingly, WINS has coordinated the efforts of 5,300 members from more than 147 states to share best practices to prevent nuclear terrorists from achieving their aims [41].

Similar to WINS’s activities, the network called International Nuclear Security Education Network (INSEN) was established under the auspices of the IAEA Nuclear Security Programme in 2010. The network aims to promote nuclear security through nuclear security education. Having an informal membership status, INSEN supports the development of peer-reviewed textbooks, training, and research programs on nuclear security [42]. Therefore, it plays a key role in developing nuclear security culture.

There are other initiatives and civil society efforts contributing to the current nuclear security regime. One of these is the Nuclear Threat Initiative (NTI), which cooperates with governments and organizations to increase awareness and offer creative solutions. The NTI aims to build a safer and more secure world through collaboration and action as an independent initiative.

The International Nuclear Security Forum (INSF) is another essential platform that creates opportunities to collaborate and share experiences among its members, provides educational support for different stakeholders, and promotes information sharing concerning nuclear security. In addition, INSF supports nuclear security implementation and promotes nuclear security leadership intending to reduce the threat of nuclear terrorism. In this vein, it creates an international platform for international experts to identify, create, and reinforce nuclear security strategies.

As seen through the above-mentioned state and non-state responses to the threat of nuclear terrorism, states have started to cooperate against it. These steps constitute the structure of the nuclear security regime which will develop in time, like the regime. However, unlike regime components, most of these international responses are voluntary and offer legally non-binding recommendations while there are insufficient or no mechanisms to monitor compliance which, in return, cause vulnerabilities to be exploited. Also, there are no comprehensive nuclear security standards, which means the absence of developed norms and culture. Yet, this does not necessarily mean that the nuclear security regime does not exist at all. In fact, what is needed for an effective nuclear security regime are developed norms, culture, and status for participating states, which are in development. Increased awareness of the threat of nuclear terrorism also plays an important role in the effectiveness of the nuclear security regime.

III. Proposed Approach to the Nuclear Security Regime

Various mechanisms have been formulated to cope with the threat of WMD terrorism, which has occupied a prominent place on the international security agenda since the 9/11 attacks. In this regard, UN Security Resolution 1373 (2001) brings legally binding responsibilities for all UN member states to address the threat of terrorism to prevent terrorists from acquiring CBRN material. Likewise, UN Security Resolution 1540 (2004) aims to prevent the acquisition of WMD by terrorists. In addition, the PSI and the SUA Convention offer important solutions for counter-proliferation by preventing the transfer of material. Apart from these attempts, CPPNM and its 2005 Amendment and the Nuclear Terrorism Convention enhance the physical protection of nuclear material and facilities and criminalize actors of nuclear terrorism, respectively. Both conventions also promote cooperation between states for the prevention of nuclear terrorism. Similarly, the GICNT provides a voluntary partnership to unite different resources against nuclear terrorism while providing an informal environment to sustain the attempts mentioned above. In addition to contributing to the awareness of the threat of nuclear terrorism, Nuclear Security

Summits, WINS, INSEN, NTI and INSF promote nuclear security and develop nuclear security culture by increasing awareness through high-level statesmen, professionals, and academics.

However, as Mustafa Kibaroglu states, “there are no comprehensive standards of nuclear security that states must follow, nor are there international transparency mechanisms that would depend on the nuclear security efforts of individual states. This creates vulnerabilities that could be exploited by capable smugglers or terrorist groups” [43]. Similarly, Nilsu Gören states that “the day-to-day implementation of the technical, legal, and regulatory aspects of nuclear security remains as the biggest challenge since the security of nuclear materials is not on high priority of governments everywhere” [44]. Thus, it makes it difficult for states to apply effective nuclear security measures. Because there are neither international standards nor independent mechanisms that would ensure that every state fulfils their nuclear security responsibilities. Moreover, there is no consensus among states on the importance of nuclear security or the credibility of the threat of nuclear terrorism.

Additionally, the lack of political will impairs the effectiveness of the existing nuclear security efforts. For instance, Russia, having the largest stocks of HEU and plutonium, had been suspicious about the U.S. leadership of the NSS process. Russia perceived the threat of nuclear terrorism as a tool of the U.S. national interest for preserving and advancing their strategic position. As a result of deteriorating relations with the West after the Ukraine crisis in 2014, Moscow drew away from the NSS process [39]. Similarly, there is also an argument that the NSS process reflected the U.S. national interests since the U.S. Government did not count some states in this process, such as Belarus, Iran, North Korea, and some other states with a considerable amount of HEU [39].

Other countries have other concerns with existing nuclear security efforts. India, Pakistan, and other few states, such as New Zealand, Peru, and South Africa, claim that the UN Security Council acted out of its scope to enforce generic provisions of Resolution 1540 without referring to a concrete security threat [17]. Similarly, China and a few other states, such as Indonesia and Malaysia, criticize the PSI process and its legality, which operates outside the UN framework and reject joining there [16]. As a result, these issues raise the question of political will related to the national interest. Consequently, such state behavior falls in the domain of Realism and its strands which prioritize survival, self-help, and struggle for power in a world of anarchy and accept limited or no cooperation in international relations. However, even though these seem to approve Realist explanations, this article argues that Regime Theory serves mutual interests by offering solutions for common problems such as the threat of nuclear terrorism. Also, Regime Theory clarifies the question of leadership which it accepts as a position for facilitating joint interest maximization.

From this point, international regimes cover all other pieces of global governance and principles, norms, rules, and decision-making procedures. As a successful example of the international regimes, the regime minimizes the traditional state-level threat of nuclear war and further proliferation while promoting the peaceful use of nuclear energy and nuclear disarmament by creating, developing, and sustaining norms, rules, decision-making procedures, and culture, as well as granting status to participating states. In addition, with five NWS assuming the leadership of the process, this regime improves itself by evolving according to the circumstances, as in the case of Review Conferences (RevCons) and the Additional Protocol (AP), to eliminate dysfunctional or insufficient sides. Therefore, it presents a good example of an international regime to inspire similar international efforts.

Table 1. Pieces of Global Governance and International Regimes

Regime Theory	International Nuclear Nonproliferation Regime	Nuclear Security Regime
International rules and laws	NPT, CTBT, FMCT, NWFZs	UNSCR1373 and 1540, CPPNM, ICSANT
International structures and mechanisms	IAEA	none
Groups	CD, ZAC, NSG	PSI, GICNT, NSS, WINS, INSEN, NTI, INSF
International norms	developed	developing
Culture	developed	developing
Status	developed	developing
Awareness	high	low
Leadership	settled	conflictual

To strengthen the existing nuclear security regime and minimize the threat of nuclear terrorism, this article suggests that the existing nuclear security regime should have all pieces of an international regime, fully developed norms, and nuclear security culture. This means that an international organization that sets comprehensive nuclear security standards and violations would monitor the implementation of applicable international rules and laws. In addition, there would be more groups and new NGOs that would cover all aspects of nuclear security-related issues. These would be enhanced through developed norms and nuclear security culture, which would give a sense of belonging and status for the participating states and motivate them. Increased awareness would also promote these steps by leading states to take necessary action against global security threats. Then, such a nuclear security regime would create more expectations for member states that share a mutual interest in preventing nuclear terrorism. This would also ease the question of leadership and political unwillingness. It would enhance cooperative habits, oversee compliance, and sanction defectors, which are key missing elements of the current nuclear security regime. Most importantly, this regime would encourage trust, continuity, and stability for international responses to the threat of nuclear terrorism. This would lead more states to participate in these international responses because it would motivate states through norms and principles and give them a sense of belonging and status.

As the most notable example of international regimes, the international nuclear nonproliferation regime can and would inspire nuclear security regime. The regime and its mechanisms to implement and monitor its provisions have improved through time, principles, norms, rules, and decision-making procedures. In contrast, the nuclear security regime still needs time to be fully developed. By building on these developed norms and status of the regime, which are the responsibilities of NWS and NNWS to implement safeguards and disarmament, the nuclear security regime can develop and sustain its norms and status for the threat that dominated the post-Cold War period. These would be becoming a member of concerning treaties and conventions and fulfilling the responsibilities stemming from these treaties and conventions.

Additionally, as norms and principles are the elements that lead states to abandon individual decision-making processes for common problems, nuclear security norms and status would contribute to the rapid development of nuclear security culture by increasing both awareness of the threat and effectiveness of the nation-level regulations and activities. At this point, elements of popular culture such as films and TV series are critical to raising awareness and the development of nuclear security culture without causing panic [44]. The NSS has already increased awareness of the threat (at the governmental level, mostly)

through the discourse used by prominent world leaders during summits, such as the Washington, D.C. summits in 2010 and 2016, the Seoul summit in 2012, and the Hague summit in 2014. Yet, in the shadow of knowing that there would be no new NSS at this level, education and communication would be the leading element in increasing awareness. These steps would help the nuclear security regime alleviate self-interested calculations, lack of awareness, and the lack of a universal definition of terrorism, as well as promote itself as a more effective international regime.

In this case, where the regime would inspire the nuclear security regime, the IAEA might get the ultimate authority for comprehensive nuclear security standards, as in the case of nuclear safety and safeguards. Thereby, the IAEA would have the authority to develop, improve, and verify nuclear security standards, implement them, and monitor states' compliance. Similar to the safeguards, there would be "guidelines" or "best practices" for nuclear security, which could be shared through the IAEA. Like RevCons, which is an example of the evolutionary side of international regimes, there would be review conferences for CPPNM and ICSANT to discuss and bring solutions for problems with the nuclear security regime, international law, and the process of negotiation of which involves all affected countries. Therefore, an international nuclear security regime inspired by the regime would offer solutions for most of the current nuclear security problems by creating, developing, and sustaining principles, norms, rules, and decision-making procedures.

Most importantly, as the threat of nuclear terrorism is a global threat, its responses should also be global. Yet, regional steps to create and develop standards and compliance measures on nuclear security would support the existing nuclear security regime, of which legal foundation could be accelerated with wider participation in existing international efforts. Then, such an international regime would bring all states together to respond to the most important threat to global security because this regime would address more states than any of the nuclear security efforts addressed alone.

This suggestion aims to provide a framework in which nuclear security becomes comprehensive and, as a result, could become more effective. Because terrorism has always evolved into deadlier forms, the next step might be a nuclear one. Along with its huge potential physical, physiological, and financial destruction, this would create a new wave of terrorism. Therefore, states need to cooperate for a comprehensive nuclear security regime before a "nuclear 9/11" happens.

At this point, any further study on Chinese and Russian views and other states' views on nuclear terrorism and nuclear security would be an important contribution to nuclear security studies. Similarly, future studies on technical requirements for various methods of nuclear terrorism would also be helpful to have a better threat assessment and make it easier to understand how even the smallest amount of radioactive materials could be used for malicious actions. These would increase awareness of the threat and promote existing nuclear security efforts.

Terrorism continues to be a threat as it has always been. It evolves into new forms, and its indiscriminate nature improves in every new form. Nuclear terrorism might be the next step because its potential lethality rate would not be compared with any other forms of terrorism if terrorists managed to detonate an intact nuclear weapon or an IND. Similarly, even though sabotaging a nuclear facility or exploding a dirty bomb would not cause a huge destruction, the psychological effects of sabotage or a dirty bomb would be much more powerful on the target audience than any other form of terrorism. Therefore, states should enhance nuclear security efforts to prevent terrorists from achieving their aims with nuclear terrorism.

Even though states have already started to cooperate against the threat of nuclear terrorism through several conventions and initiatives, nuclear security needs comprehensive attention to be more effective. At this point, current international responses to the threat of nuclear terrorism and nuclear security culture

are at the stage of development. And, as a global threat to global security, the threat of nuclear terrorism requires a global solution. However, current international responses to the threat of nuclear terrorism cannot appeal to some states that either lack political will or are unaware of the urgency of the threat. In addition, there is no mechanism to monitor the implementation and compliance of the current international efforts.

IV. Works Cited

1. W. Enders, T. Sandler, After 9/11: Is it All Different Now? *J. Confl. Resolut.* **49**, 259–277 (2005).
2. G. Bunn, J. B. Rhinelander, LOOKING BACK: The Nuclear Nonproliferation Treaty Then and Now. *Arms Control Assoc.* (2008), (available at <https://www.armscontrol.org/act/2008-08/looking-back-nuclear-nonproliferation-treaty-then-now>).
3. Status of the Treaty. *Treaty Non-prolif. Nucl. Weapons*, (available at <http://disarmament.un.org/treaties/t/npt>).
4. Overview. *Int. At. Energy Agency IAEA*, (available at <https://www.iaea.org/about/overview>).
5. IAEA Safety Glossary. *Int. At. Energy Agency IAEA* (2017), (available at <https://www.iaea.org/resources/safety-standards/safety-glossary>).
6. Remarks By President Barack Obama In Prague As Delivered. *White House Pres. Barack Obama* (2009), (available at <https://obamawhitehouse.archives.gov/the-press-office/remarks-president-barack-obama-prague-delivered>).
7. M. Bunn, Y. Morozov, R. Mowatt-Larssen, S. Saradzhyan, W. Tobey, V. I. Yesin, P. S. Zolotarev, *The U.S.-Russia Joint Threat Assessment on Nuclear Terrorism* (Belfer Center for Science and International Affairs, Institute for U.S. and Canadian Studies, Cambridge and Moscow, 2011; <http://www.belfercenter.org/sites/default/files/files/publication/Joint-Threat-Assessment%20ENG%2027%20May%202011.pdf>).
8. M. Bunn, M. B. Malin, N. Roth, W. H. Tobey, *Preventing Nuclear Terrorism: Continuous Improvement or Dangerous Decline?* (Belfer Center for Science and International Affairs, Cambridge, 2016; <https://dash.harvard.edu/bitstream/handle/1/27306735/BunnPreventingNuclearTerrorismfinal.pdf?sequence=1&isAllowed=y>), *Project on Managing the Atom*.
9. S. Burchill, A. Linklater, R. Devetak, J. Donnelly, M. Paterson, C. Reus-Smit, J. True, *Theories of International Relations* (Palgrave Macmillan, Hampshire and New York City, ed. 3, 2005; <http://lib.jnu.ac.in/sites/default/files/RefrenceFile/Theories-of-IR.pdf>).
10. J. F. Kennedy, News Conference 52, March 21, 1963 (1963), (available at <https://www.jfklibrary.org/archives/other-resources/john-f-kennedy-press-conferences/news-conference-52>).
11. A. L. Prgenzer, Evolution and resilience of the nuclear nonproliferation regime. *AIP Conf. Proc.* **1596**, 152–159 (2014).
12. S. Udum, “The Role of Turkey in the 2015 NPT Review Conference,” *EDAM Discussion Paper Series 2015/1* (Centre for Economics and Foreign Policy Studies (EDAM), NPT Review

- Conference, 2015), (available at <https://edam.org.tr/wp-content/uploads/2015/05/The-Role-of-Turkey-in-the-2015-NPT-Review-Conference.pdf>).
13. M. P. Karns, K. A. Mingst, K. W. Stiles, *International Organizations: The Politics and Processes of Global Governance* (Lynne Rienner Publishers, Inc., Boulder, CO, ed. 3, 2015).
14. E. Rosand, Security Council Resolution 1373, the Counter-Terrorism Committee, and the Fight Against Terrorism. *Am. J. Int. Law.* **97**, 333–341 (2003).
15. “Resolution 1540 (2004)” (S/RES/1540 (2004), United Nations Security Council, 2004), (available at [https://www.un.org/en/ga/search/view_doc.asp?symbol=S/RES/1540\(2004\)](https://www.un.org/en/ga/search/view_doc.asp?symbol=S/RES/1540(2004))).
16. J. Boureston, T. Ogilvie-White, “Seeking Nuclear Security Through Greater International Coordination,” *International Institutions and Global Governance Program* (Council on Foreign Relations, 2010), (available at <https://www.jstor.org/stable/resrep05685>).
17. M. Heupel, Surmounting the Obstacles to Implementing UN Security Council Resolution 1540. *Nonproliferation Rev.* **15**, 95–102 (2008).
18. “Text of the Convention on the Physical Protection of Nuclear Material” (INFCIRC/274, International Atomic Energy Agency (IAEA), 1979), (available at <https://www.iaea.org/sites/default/files/infirc274.pdf>).
19. Convention on the Physical Protection of Nuclear Material (CPPNM). *Nucl. Threat Initiat. NTI* (2022), (available at <https://live-nuclear-threat-initiative.pantheonsite.io/education-center/treaties-and-regimes/convention-physical-protection-nuclear-material-cppnm/>).
20. “Amendment to the Convention on the Physical Protection of Nuclear Material” (INFCIRC/274/Rev.1/Mod.1 (Corrected), International Atomic Energy Agency (IAEA), 2005), (available at <https://www.iaea.org/sites/default/files/publications/documents/infircs/1979/infirc274r1m1c.pdf>).
21. “The Physical Protection of Nuclear Material” (INFCIRC/225, International Atomic Energy Agency (IAEA), 2011), (available at <https://www.iaea.org/publications/documents/infircs/physical-protection-nuclear-material>).
22. *Code of Conduct on the Safety and Security of Radioactive Sources* (International Atomic Energy Agency (IAEA), Vienna, 2004; <https://www.iaea.org/publications/6956/code-of-conduct-on-the-safety-and-security-of-radioactive-sources>), *Non-serial Publications*.
23. Codes of Conduct. *Int. At. Energy Agency (IAEA)* (2016), (available at <https://www.iaea.org/topics/codes-of-conduct>).
24. International Convention for the Suppression of Acts of Nuclear Terrorism (2005), (available at <http://www.un.org/en/sc/ctc/docs/conventions/Conv13.pdf>).
25. P. Willan, The Convention on the Suppression of Acts of Nuclear Terrorism: An Old Solution to a New Problem. *Georget. J. Int. Law.* **39**, 527–550 (2008).
26. N. Ronzitti, WMD Terrorism. *Jpn. Yearb. Int. Law.* **52**, 175–190 (2009).

27. Convention for the Suppression of Unlawful Acts Against the Safety of Maritime Navigation, Protocol for the Suppression of Unlawful Acts Against the Safety of Fixed Platforms Located on the Continental Shelf. *Int. Marit. Organ. (IMO)*, (available at <https://www.imo.org/en/About/Conventions/Pages/SUA-Treaties.aspx>).
28. S. D. MacDonald, The SUA 2005 Protocol: A Critical Reflection. *Int. J. Mar. Coast. Law.* **28**, 485–516 (2013).
29. “Protocol of 2005 to the Convention for the Suppression of Unlawful Acts against the Safety of Maritime Navigation” (LEG/CONF.15/21, International Maritime Organization (IMO), 2005), (available at https://www.unodc.org/tldb/pdf/Protocol_2005_Convention_Maritime_navigation.pdf).
30. Proliferation Security Initiative (PSI). *Nucl. Threat Initiat. NTI* (2015), (available at <https://live-nuclear-threat-initiative.pantheonsite.io/education-center/treaties-and-regimes/proliferation-security-initiative-psi/>).
31. E. Belcher, “The Proliferation Security Initiative: Lessons for Using Nonbinding Agreements,” *International Institutions and Global Governance Program* (Council on Foreign Relations, 2011).
32. Overview. *Glob. Initiat. Combat Nucl. Terror. GICNT*, (available at <https://www.gicnt.org/>).
33. R. Alcaro, The Global Initiative to Combat Nuclear Terrorism: Big Potential, Limited Impact? *Int. Spect. Ital. J. Int. Aff.* **44**, 99–112 (2009).
34. History. *Nucl. Secur. Summit Wash. 2016* (2016), (available at <http://www.nss2016.org/about-nss/history>).
35. 2010 - Washington, DC. *Nucl. Secur. Summit Wash. 2016* (2016), (available at <http://www.nss2016.org/past-summits/2010>).
36. 2012 - Seoul. *2016 Nucl. Secur. Summit Wash. 2016* (2016), (available at <http://www.nss2016.org/past-summits/2012>).
37. 2014 - The Hague. *2016 Nucl. Secur. Summit Wash. 2016* (2016), (available at <http://www.nss2016.org/past-summits/2014>).
38. Nuclear Security Summit 2016 Communiqué (2016), (available at <http://www.nss2016.org/s/Communique-qdbv.pdf>).
39. The Last Nuclear Security Summit. *Strateg. Comments.* **22**, vi–viii (2016).
40. Governing Statute of the World Institute for Nuclear Security (WINS) (2018), (available at <https://www.wins.org/wp-content/uploads/2018/09/2018-05-03-Governing-Statute-of-the-World-Institute-for-Nuclear-Security-FINAL.pdf>).
41. World Institute for Nuclear Security (WINS). *Nucl. Threat Initiat. (NTI)*, (available at <https://www.nti.org/about/programs-projects/project/wins/>).

42. International Nuclear Security Education Network (INSEN). *Int. At. Energy Agency (IAEA)* (2018), (available at <https://www.iaea.org/resources/network/international-nuclear-security-education-network-insen>).
43. M. Kibaroglu, The Threat of Nuclear Terrorism Requires Concerted Action. *Strateg. Anal.* **38**, 209–216 (2014).
44. N. Gören, Re: Nukleer Terorizm Konulu Tez Hk (2017).

V. Acknowledgements

I would like to express my deepest appreciation to Assoc. Prof. Şebnem Udum, without whom I would not understand the importance of nuclear security. I also thank my wife Nesibe and my daughter Ipek for their continuing support and love. Finally, my sincere thanks also go to the great teams of the UK's Nuclear Security Culture Programme and the World Institute for Nuclear Security for their contribution to my academic and professional life.