Hacettepe University Graduate School of Social Sciences

Department of International Relations

THREAT OF NUCLEAR TERRORISM:

TOWARDS AN EFFECTIVE NUCLEAR SECURITY REGIME

Muhammed Ali ALKIŞ

Master's Thesis

Ankara, 2017

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Bu çalışmadaki bütün bilgi ve belgeleri akademik kurallar çerçevesinde elde ettiğimi, görsel, işitsel ve yazılı tüm bilgi ve sonuçları bilimsel ahlak kurallarına uygun olarak sunduğumu, kullandığım verilerde herhangi bir tahrifat yapmadığımı, yararlandığım kaynaklara bilimsel normlara uygun olarak atıfta bulunduğumu, tezimin kaynak gösterilen durumlar dışında özgün olduğunu, Yrd. Doç. Dr. Şebnem UDUM danışmanlığında tarafımdan üretildiğini ve Hacettepe Üniversitesi Sosyal Bilimler Enstitüsü Tez Yazım Yönergesine göre yazıldığını beyan ederim.

Muhammed Ali ALKIŞ

ÖZET

ALKIŞ, Muhammed Ali. *Nükleer Terörizm Tehdidi: Daha Etkili Bir Nükleer Emniyet Rejimine Doğru*, Yüksek Lisans Tezi, Ankara, 2017.

Terörizm, çeşitli şekilleriyle her zaman insanlık tarihinin bir parçası olmuş, fakat 11 Eylül saldırılarına kadar hiç bu kadar net ve hissedilir bir tehdit olmamıştı. 11 Eylül saldırılarıyla birlikte, terörizm beraberinde çok fazla ölüm getirecek çarpıcı saldırılarla sistemi değiştirmeyi hedefleyen bir terörizme, mega-terörizme dönüştü. Ve bugün, terörizm nükleer terörizm şekliyle bir tehdit oluşturuyor. Eğer teröristler bir nükleer silahı veya kendi hazırladıkları bir nükleer cihazı patlatacak olursa, nükleer terörün muhtemel ölüm oranı diğer terör ölüm oranlarıyla kıyaslanamayacak kadar büyük olacaktır. Ayrıca, nükleer santralleri sabotaj etmek veya "kirli bomba" patlatmak gibi saldırıların da psikolojik etkileri diğer terörizm şekillerinden çok daha fazla etkili olacaktır. Bu noktada, bu tehdide karşı olarak ülkeler nükleer emniyet olarak bilinen çeşitli uluslararası tepkilerle işbirliği yapmaktadır. Fakat nükleer emniyet hala gelişme aşamasında olup, nükleer terörizmle etkili biçimde mücadele edecek kadar güçlü görünmemektedir. Diğer taraftan, nükleer silahsızlanma, nükleer enerjinin barışçıl amaçlarla kullanımı ve nükleer silahsızlanma üzerine kurulu uluslararası nükleer silahların yayılmasının önlenmesi rejimi bulunmaktadır. Ama bu rejimin kapsamı geleneksel devlet aktörlerinden kaynaklı nükleer savaş ve nükleer silahlanma gibi tehditleri içermektedir. Yine de, bu rejim nükleer emniyetin kendisini geliştirmesinde bir üs görevi görebilir. Bu nedenle, bu tez uluslararası nükleer silahların yayılmasının önlenmesi rejiminden esinlenerek, nükleer terör tehdidine karşı geliştirilen uluslararası tepkilerin daha etkili bir nükleer emniyet oluşturabilmesi için bir yapı sunmayı amaçlamaktadır.

Anahtar Sözcükler

Nükleer Terörizm, Nükleer Emniyet, Nükleer Silahların Yayılmasının Önlenmesi Rejimi, Nükleer Silah, El Yapımı Nükleer Cihaz, Nükleer Tesis, Kirli Bomba

ABSTRACT

ALKIŞ, Muhammed Ali. *Threat of Nuclear Terrorism: Towards An Effective Nuclear Security Regime*, Master's Thesis, Ankara, 2017.

Terrorism has always been a part of human history with various forms. However, it had not been such a clear and present danger till the 9/11 attacks. With the 9/11 attacks, terrorism has evolved into a new terrorism, mega terrorism, which only aims to change the system with sensational attacks causing so many deaths. And today, it poses a threat with the form of nuclear terrorism. Its potential rate of lethality would 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, psychological effects of sabotaging a nuclear facility or exploding a "dirty bomb" would be much more powerful than any other forms of terrorism. Yet, as a response, states have already started to cooperate against the threat of nuclear terrorism through various international responses which are known as nuclear security. But, nuclear security is still developing and seems not strong enough to effectively cope with the threat of nuclear terrorism. On the other hand, there is the international nuclear nonproliferation regime based on three pillars of nuclear nonproliferation, 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 itself. Therefore, the thesis is an attempt to propose a more effective framework for the international responses to the threat of nuclear terrorism which would lead to more effective nuclear security with the guidance and inspiration of international nuclear nonproliferation regime.

Key Words

Nuclear Terrorism, Nuclear Security, Nuclear Nonproliferation Regime, Nuclear Weapon, Improvised Nuclear Device, Nuclear Facility, Dirty Bomb

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ABBREVIATIONS

4GW	Fourth Generation Warfare
AP	Additional Protocol
Am-241	Americium-241
ANWFZ	African Nuclear Weapon Free Zone
ASEAN	Association of Southeast Asian Nations
BCN	Biologic, Chemical and Nuclear
BTWC	Biological and Toxic Weapons Convention
CANWFZ	Nuclear-Weapon-Free Zone in Central Asia
CD	Conference on Disarmament
Co-60	Cobalt-60
CPPNM	Convention on the Physical Protection of Nuclear Material
Cs-137	Cesium-137
CSA	Comprehensive Safeguards Agreement
CTBT	Comprehensive Nuclear-Test Ban Treaty
EEZ	Exclusive Economic Zone
EOKA	National Organization of Cypriot Struggle
EPRI	Electric Power Research Institute
ETA	Basque Nation and Liberty
FAS	Federation of American Scientists
FLN	National Liberation Front
FMCT	Fissile Material Cutoff Treaty
GICNT	Global Initiative to Combat Nuclear Terrorism
GSR	Gas Cooled Reactor
HEU	Highly Enriched Uranium
HINW	Humanitarian Impact of Nuclear Weapons
IAEA	International Atomic Energy Agency
ICBM	Intercontinental Ballistic Missile
IGO	Intergovernmental Organization
IND	Improvised Nuclear Device

INSEN	International Nuclear Security Education Network
Ir-192	Iridium-192
IRA	Irish Republican Army
IS	Islamic State
ITDB	Incident and Trafficking Database
LLNL	Lawrence Livermore National Laboratory
LWR	Light Water Reactor
NAM	Non-Aligned Movement
NATO	North Atlantic Treaty Organization
NEI	Nuclear Energy Institute
NGO	Non-Governmental Organization
NNWS	Non-Nuclear-Weapon State
NPT	Nuclear Nonproliferation Treaty
NRC	Nuclear Regulatory Commission
NSG	Nuclear Suppliers Group
NSS	Nuclear Security Summit
NWFZ	Nuclear-Weapon-Free Zone
NWS	Nuclear-Weapon State
OPANAL	Agency for the Prohibition of Nuclear Weapons in Latin America and the Caribbean
PAL	Permissive Action Link
PLO	Palestine Liberation Army
PSI	Proliferation Security Initiative
RDD	Radiological Dispersal Device
SAFF	Safing, Arming, Fusing and Firing
SEANWFZ	Southeast Asia Nuclear Weapon-Free Zone
SLBM	Submarine-Launched Ballistic Missiles
SPNFZ	South Pacific Nuclear Free Zone
SQ	Significant Quantity
UK	the United Kingdom
U.S.	United States of America

UN	United Nations
WINS	World Institute for Nuclear Security
WMD	Weapons of Mass Destruction
WWI	World War I
WWII	World War II
ZAC	The Zangger Committee
ZOPFAN	Zone of Peace, Freedom and Neutrality in South-East Asia

FIGURE

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INTRODUCTION

Terrorism, "the deliberate creation and exploitation of fear through violence or the threat of violence in the pursuit of political change",[1] is not a new issue. It can be traced back to ancient times or even to primitive societies, even though it looked different than what terrorism is now. By this time, terrorism has adopted different faces. It has become much deadlier and much more destructive through the time. Especially with the 9/11 attacks, terrorism has become something which could be felt by anyone in anytime. Actually, it has become a new terrorism, "mega terrorism", which emerged as a clear and present danger to dominate security problem in the post-Cold War period.[2] Because, with the 9/11 attacks, this new terrorism showed its aim to change the system, not just to assassinate a leader, cause a political change or overthrow a government. In order to achieve their aims, terrorists have already showed their willingness with the 9/11 attacks for sensational attacks which might result in unprecedented level of lethality and destruction. Next step in this mega terrorism might be nuclear terrorism which is the only form of terrorism that might result in death of "hundreds of thousands of people".[3]

After the 9/11 attacks, the threat of nuclear terrorism has been a concern. Because, these attacks showed how a terrorist attack could cause mass casualties even without using a traditional weapon of mass destruction (WMD) as well as capability and intention of terrorists who do not hesitate to use unprecedented attack scenarios.[4] In addition to the incomparable physical, physiological and financial destruction, 9/11 attacks were conceived, on the phenomenological level, as an act of war by the U.S. Government which led to declaration of "war on terror", even though there was no state actor in attacks. This resulted in a series of battles and skirmishes for nearly a decade. Therefore, "the slippage between 'terrorist attack' and 'war' is an essential feature of 9/11".[5] Also, even

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[1] Bruce Hoffman, *Inside Terrorism* (New York: Columbia University Press, 2006), 40.
[2] Harald Müller, *Terrorism, Proliferation: A European Threat Assessment* (Paris: European Union Institute for Security Studies (EUISS), 01 March 2003), 7.
[3] Graham T. Allison, "Nuclear Terrorism: The Ultimate Preventable Catastrophe," *Defence Against Terrorism Review* 3, no. 1 (2010): 99.
[4] Walter Enders and Todd Sandler, "After 9/11: Is it All Different Now?," *The Journal of Conflict Resolution* 49, no. 2 (2005): 260.
[5] Robert Doran, "Introduction: Terrorism and Cultural Theory: The Singularity of 9/11," *SubStance* 37, no. 1 (2008): 11.

though the attacks targeted the World Trade Center and the Pentagon, the Western intelligentsia considered these as attacks on the Western world itself and its symbolic capital New York.[6] As terrorist groups have already showed their willingness to try causing maximum damage possible, it is not a far option for them to try below-mentioned acts of nuclear terrorism. Unfortunately, state-level oriented efforts such as nuclear deterrence might not be quite effective to prevent these terrorist groups.[7]

Although it is relatively a new issue compared to terrorism, nuclear nonproliferation efforts date back to early years of the Cold War era.[8] Especially after the Cuban Missile Crisis in 1962, when the confrontation between United States and the Soviet Union brought the world closer to a nuclear conflict,[9] there was need for pushing for stability and minimizing the possibility of nuclear weapon proliferation and nuclear war. Therefore, concerns stemming from the possibility of proliferation of nuclear capabilities as well as the possibility of a nuclear war between nuclear powers during the Cold War resulted in the first steps of nuclear nonproliferation efforts which have evolved into the international nuclear nonproliferation regime.[10]

The cornerstone of the international nuclear nonproliferation regime is the Treaty on the Non-Proliferation of Nuclear Weapons (Nuclear Nonproliferation Treaty, NPT) which entered into force in 1970.[11] According to the NPT, five states have nuclear weapons in their arsenals as nuclear-weapon states (NWS) "which have manufactured and exploded a nuclear weapon or other nuclear explosive device prior to 1 January 1967".[12] Thus, the NPT creates a differentiation between NWS and non-nuclear-weapon states (NNWS) that

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[6] Ibid., 3.
[7] Andrew Moran, "Nuclear Proliferation," in *International Security Studies : Theory and Practice* (London: Routledge, 2015).
[8] George Bunn and John B. Rhinelander, "Looking Back: the Nuclear Nonproliferation Treaty Then and Now," Arms Control Association, accessed March 26, 2017. https://www.armscontrol.org/act/2008_07-08/lookingback.
[9] "The Cuban Missile Crisis, October 1962," Office of the Historian, accessed March 26, 2017. https://history.state.gov/milestones/1961-1968/cuban-missile-crisis.
[10] "What Is It? Why Is It Important?," Nuclear Threat Initiative, accessed September 25, 2016. http://tutorials.nti.org/nonproliferation-regime-tutorial/nti-nuclear-nonproliferation-regime-treaties-by-country/.
[11] "Status of the Treaty, Treaty on the Non-Proliferation of Nuclear Weapons," United Nations Office for Disarmament Affairs, accessed February 20, 2017. http://disarmament.un.org/treaties/t/npt.
[12] Article IX/2, *Treaty on the Non-Proliferation of Nuclear Weapons (NPT)*, (1970), http://disarmament.un.org/treaties/t/npt/text.

agree not to manufacture, transfer or seek assistance in acquiring nuclear weapons or nuclear explosive devices directly or indirectly.[13] While the NPT brings limitation on the number of state that owns nuclear weapons, it supports peaceful use of nuclear energy for all parties to the Treaty.[14] Also, all parties to the Treaty agree to "to pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament".[15]

In addition, as a component of the regime, the International Atomic Energy Agency (IAEA) is "the world's central intergovernmental forum"[16] which concentrates on the scientific and technical cooperation concerning the nuclear science and technology. The IAEA serves for safe and secure use of nuclear technology as well as its peaceful use which supplements the international peace and security.[17] Similarly, covering all multilateral arms control and disarmament efforts, the Conference on Disarmament (CD) provides a base for treaties such as Comprehensive Nuclear-Test Ban Treaty (CTBT) and Fissile Material Cut-off Treaty (FMCT).[18]

Also being components of the regime, the Zangger Committee (ZAC) and the Nuclear Suppliers Group (NSG) supplement the regime by providing guidelines to ensure peaceful use of nuclear materials.[19] From a similar point, Nuclear-Weapon-Free zones (NWFZ) reinforce the regime by creating regional cooperation environment carrying global values of the regime and being consistent with the NPT Article VII.[20] As it can be inferred from the components of it, the regime is based on three main pillars which are nuclear nonproliferation, peaceful use of nuclear energy and nuclear disarmament.

On the other hand, nuclear security is a new issue which emerged as a response to the threat of nuclear terrorism. By definition, nuclear security is "the prevention and detection

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[13] Article II, ibid.
[14] Article IV, ibid.
[15] Article VI, ibid.
[16] "Overview," International Atomic Energy Agency, accessed March 26, 2017. https://www.iaea.org/about/overview.
[17] Ibid.
[18] "Conference on Disarmament (CD)," Nuclear Threat Initiative, last modified February 2, 2017, accessed February 22, 2017. http://www.nti.org/learn/treaties-and-regimes/conference-on-disarmament/.
[19] "About the NSG," Nuclear Suppliers Group, accessed February 23, 2017. http://www.nuclearsuppliersgroup.org/en/about-us.
[20] *Treaty on the Non-Proliferation of Nuclear Weapons (NPT)*.

of, and response to, theft, sabotage, unauthorized access, illegal transfer or other malicious acts involving nuclear material, other radioactive substances or their associated facilities".[21] As it is generally confused with nuclear safety, the basic distinction offered by the IAEA is that nuclear security is the prevention of "the malicious or negligent actions by humans that could cause or threaten harm to other humans" and nuclear safety is the prevention of "the broader issue of harm to humans (or the environment) from radiation, whatever the cause".[22]

After 9/11 attacks, nuclear security has become increasingly important. And especially with former U.S. President Obama's Prague speech in 2009, nuclear security has gained more publicity as President Obama highlighted the threat of nuclear terrorism by pointing out black market trade, spread of nuclear technology and terrorists' determination to acquire nuclear weapons or nuclear explosive devices.[23] This threat might appear in various scenarios. For example, as an act of nuclear terrorism, terrorists might try to cause dissemination of radioactive materials through radiological devices or cause 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) which might be acquired through various methods.[24] Although most of the terrorists 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 as well as their financial resources.[25] However, as a results of the threat, states have started to look for ways of cooperation for nuclear security, which is response to the threat, through different agreements and initiatives such as UN Security Resolutions, conventions, initiatives and summits. Yet, nuclear security efforts are the stage of development and need comprehensive attention on the threat. Because, in case of a successful nuclear terrorist

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[21] "Concepts and Terms," International Atomic Energy Agency, last modified May 31, 2016, accessed February 26, 2017. http://www-ns.iaea.org/standards/concepts-terms.asp.
[22] Ibid.
[23] Barrack Obama, "Remarks By President Barack Obama In Prague As Delivered," White House Office of the Press Secretary, accessed August 03, 2016. https://obamawhitehouse.archives.gov/the-press-office/remarks-president-barack-obama-prague-delivered.
[24] Matthew Bunn et al., *The U.S.-Russia Joint Threat Assessment of Nuclear Terrorism* (Cambridge, Mass.: Belfer Center for Science and International Affairs, and the Institute for U.S. and Canadian Studies, June 6, 2011), http://www.belfercenter.org/sites/default/files/files/publication/Joint-Threat-Assessment%20ENG%2027%20May%202011.pdf.
[25] Charles D. Ferguson et al., *The Four Faces of Nuclear Terrorism* (New York: Routledge, 2005), 38-39.

act such as detonation of an IND, a major city could turn into a radioactive debris along with causing death of thousands of people and even more injured people.[26] So, even the lowest probability of nuclear terrorist act requires utmost attention to take nuclear security steps.[27] This requires strengthening nuclear security regime and nuclear security culture which is still developing.

Considering all above mentioned, this thesis aims to answer following research question:

How should the international nuclear security efforts be to more effectively cope with the threat of nuclear terrorism?

Answering this question requires not only evaluation of the international nuclear nonproliferation regime and nuclear security efforts but also evaluation of the intention and capabilities for nuclear terrorism which helps to have a better understanding of the threat. At this point, benefitting from Regime Theory for theoretical perspective and the international nuclear nonproliferation regime for practical approach will be helpful to answer the research question and offer a more effective solution to the threat of nuclear terrorism. Because, while Regime Theory offers how an international regime should be in order to offer solutions for common problems of states, the international nuclear nonproliferation regime shows how an international regime could be effective in practice. In addition, this regime handles nuclear nonproliferation efforts which are related to state-level threats. As an effective regime for traditional threat, this regime could inspire nuclear security regime, which handles non-state-level threats, to become more effective. Accordingly, the thesis also tries to answer following sub-questions:

What does an international regime for international efforts to cope with a threat?

What is the status of the current nuclear nonproliferation regime?

What is the organizational advantages of nuclear nonproliferation regime for nuclear security?

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[26] Matthew Bunn et al., *Preventing Nuclear Terrorism: Continuous Improvement or Dangerous Decline?* (Cambridge, Mass.: Project on Managing the Atom, Belfer Center for Science and International Affairs, Harvard Kennedy School, March 2016), 14-15.
[27] Ibid., 15.

How real and urgent is the threat of nuclear terrorism?

Which terrorist groups are linked to nuclear terrorism and are they capable of it?

What are the international responses to the threat of nuclear terrorism?

In an attempt to answer the research sub-question and these questions, the thesis will offer three chapters. The first chapter will aim to present a literature review on characteristics of war and terrorism to illustrate change in the formal application of violence by states and application of violence by terrorism through different ways. By doing so, the thesis will highlight the importance of evolution of terrorism and its indiscriminative nature which gives basis for nuclear terrorism. This part will also link nuclear security as a response to nuclear terrorism. The remaining part of the chapter will focus on two main International Relations (IR) theories, Realism and Liberalism, in accordance to their explanation of cooperation. Afterwards, Regime Theory will concentrate on the characteristics of an international regime.

In the second chapter which will consist of two parts, the thesis will start by focusing on the international nuclear nonproliferation regime and its components. Each section will seek to offer a detailed description of related component by giving historical background behind its establishment and its current status as well as its objectives which reinforce this regime. In following parts of the chapter, the thesis will attempt to present the framework of the international responses to the threat of nuclear terrorism by detailing agreements and initiatives while trying to reflect the need for a comprehensive nuclear security regime.

In the third chapter, the thesis will attempt to present different scenarios of generally accepted acts of nuclear terrorism and their difficulties to accomplish. The aim in doing so will be to present “potential” nuclear terrorist groups that are more inclined to exploit weaknesses in the nuclear security and to explain the incentives that lead them to do so as well as their intentions and capabilities. The part will show possible scenarios which terrorists might make use of in order to achieve their aims and to show how difficulties to do so. The final part of the chapter will evaluate all the research in three chapters and propose how the international nuclear security efforts should be to more effectively cope with the threat of nuclear terrorism.

In order to reach above-mentioned point, the thesis will benefit from Regime Theory for theoretical framework to work within and descriptive research of data from concerning primary sources such as, conventions, official document, reports, resolutions, speeches, treaties and secondary sources such as peer-reviewed articles, books, internet sources including official web sites. The thesis also will benefit from tables and figures in order to complement its descriptive structure. All sources used are written in English. And most of the secondary sources are written predominantly by U.S. academicians, authors, and researchers.

There is not any similar thesis written in Turkey covering nuclear security and the international nuclear nonproliferation regime. Even though there are thesis written about the regime, their scope covers neither nuclear terrorism nor nuclear security. Also, there is only one thesis which might be linked to nuclear security, but its scope is limited to cyber security at nuclear facilities.[28]

Similarly, even though there are many thesis written individually about the regime, nuclear security and nuclear terrorism abroad, their scope is also limited to either state limited threat approach or global violations of the regime or more detailed focus on specific terrorist groups.[29]

[28] This information is derived from Council of Higher Education(YÖK), Thesis Center on March 1, 2017.
[29]This information is derived from ProQuest Dissertations & Theses Global on March 1, 2017.

CHAPTER I: CONCEPTUAL FRAMEWORK

This chapter starts with background information about war and terrorism for a better understanding of changing nature of terrorism. It reflects that even though war is a kind of violence as an instrument of policy, it has rules to abide by. It further explains new forms of wars which are sometimes linked to terrorism. In the second part of the chapter, terrorism which has an indiscriminative nature and its evaluation is discussed during which this section benefits from David Rapoport's *Terrorism's Four Waves* approach. This part clearly shows the difference between war and terrorism which has been increasingly lethal and has no rules, unlike war. Then, the chapter explains the link between nuclear terrorism and nuclear security which is a respond to the former. In the last part of the chapter, two main IR theories, Realism and Liberalism, are discussed in accordance with their approach to cooperation. In the final part of the chapter, the characteristics of international regimes are given through the Regime Theory which is the theoretical framework to work within before moving to the second chapter which start with the international nuclear nonproliferation regime.

1.1. CHANGING NATURE OF WAR

War has always been a part of human history. And, as Samuel Weber suggests, it has been sometimes associated with terrorism.[30] So, it will be helpful to start with its definition. Even though there are different definitions of it, it is generally accepted as armed conflicts between states with the exception of civil and guerilla wars within a state.[31] For Mary Kaldor, war is "violence between states or organized political groups for political motives".[32] According to Nicholas Rengger and Caroline Kennedy-Pipe, war was firstly seen as the pursuit of a ruler's interest and then as the pursuit of state's interest. Following the Westphalian settlement in 1648, state's first and foremost aim was to maximize its interest and war was simply a tool to achieve it. And for Rengger and

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[30] Samuel Weber, "War, Terrorism, and Spectacle, or: On Towers and Caves," *Grey Room*, no. 7 (2002): 15.
[31] Ibid., 16.
[32] Mary Kaldor, "Introduction," in *New and Old Wars* (Stanford, California: Stanford University Press, 1999), 2.

Kennedy-Pipe, this idea was best represented by Carl von Clausewitz.[33]For Clausewitz, "war is an act of force to compel our enemy to do our will".[34] And he states that "war is merely the continuation of policy by other means"[35] He also adds that there are two different motives that lead men to fight one another. These are hostile feelings and hostile intentions. According to him, fighting is an expression of hostile feelings and these feelings turn into hostile intentions in large scale fighting which is called as war.[36]

However, war should not be seen a policy without limitations. From this perspective, Rengger and Kennedy-Pipe state that "as a human institution, war is inevitably an evaluative practice and is equally inevitably subject, in a certain sense at least, to rules"[37] which refers to "just war theory" that consists of *jus ad bellum* (the right to go to war) and *jus in bello* (the right conduct within war).[38]

So, it could be said that war is a conduct of states with its objectives, rules and obligations. However, as Kaldor states, organized violence has changed since 1980s as a natural result of globalizing world which resulted with the conception of "new wars". She points out that the reason behind her distinction of old and new war is a result of new wars' blurry lines between war, organized crime and large scale human rights violations.[39] She also adds that unlike old wars of which critical confrontation takes place at the battlefield between armed forces, new wars happen in failed states framework. Also, combatants of these new wars are a mixture of states and non-state actors consisting as a network of regular forces, militias, mercenaries and warlords, and violence mainly targets civilians.[40]

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[33] Nicholas Rengger and Caroline Kennedy-Pipe, "The State of War," *International Affairs (Royal Institute of International Affairs 1944-)* 84, no. 5 (2008): 894.
[34] Carl von Clausewitz, *On War*, ed. Beatrice Heuser, trans. Peter Paret Michael Howard (Oxford University Press, 2007), 13.
[35] Ibid., 18.
[36] Ibid., 14, 86.
[37] Rengger and Kennedy-Pipe, "The State of War," 894.
[38] It should be also noted that there is an inclination for *jus post bellum* (justice after war) to be included in just war theory. For more details, see Alex J. Bellamy, *Just Wars: From Cicero to Iraq* (Wiley, 2006); Carsten Stahn, "'Jus ad bellum', 'jus in bello' . . . 'jus post bellum'? –Rethinking the Conception of the Law of Armed Force," *European Journal of International Law* 17, no. 5 (2006); Colleen Murphy, "Political Reconciliation, Jus Post Bellum and Asymmetric Conflict," *Theoria: A Journal of Social & Political Theory* 62, no. 145 (2015).
[39] Kaldor, "Introduction," in *New and Old Wars*, 2.
[40] Mary Kaldor, "The "New War" in Iraq," *Theoria: A Journal of Social & Political Theory*, no. 109 (2006): 1; Metta Spencer, "New wars and old: An interview with Mary Kaldor," *Peace Magazine* 31, no. 4 (2015): 1.

As a result, she believes that the logic in new wars is different than old wars. She evaluates this logic as "with new wars the various warring parties are more interested in the condition of war than in winning or losing. Such a war is like a mutual enterprise that's very difficult to end, like a social condition, rather than like a contest of wills".[41]

There are also other approaches that aim to address changing nature of war. One of them is "fourth generation warfare" (4GW) developed by William S. Lind, et al. in 1989.[42] Lind and his military colleagues offer an evaluation of warfare through four generations. The first generation of warfare is associated with the armed conflicts similar to the Napoleonic Wars period during which smoothbore musket, line and column tactics played an important role. The second generation refers to application of industrial developments such as rifled barrel, indirect fire and machine gun, and depended on attrition by using linear fire and movement tactics.[43] The third generation warfare focused maneuver rather than attrition and in this generation, the aim was to infiltrate and collapse enemy force instead of getting closer and destroying the enemy forces.[44]

After these generations, Lind et al. state that war has evolved into 4GW which does not depend on mass manpower, mass firepower and maneuver like previous generations, respectively.[45] However, Lind et al. also state that there are some elements of previous generation that will be also in 4GW and be more influential. These include greater dispersion on the battlefield including the whole society of enemy, less dependence on central logistics, agility and increased maneuver, and internally collapsing enemy. As a result of these elements and characteristic of 4GW, Lind et al. believe that the line between war and peace will be blurry, as well as the line between combatants and noncombatants. They also assume that there will be no definable battlefield.[46] Evaluating 4GW, Mat Phelan argues that even though Lind et al. do not actually mention terrorism

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[41] Spencer, "New wars and old: An interview with Mary Kaldor," 1.
[42] William S. Lind et al., "The Changing Face of War: into the Fourth Generation," *Marine Corps Gazette* 73, no. 10 (1989).
[43] Greg Simons, "Fourth Generation Warfare and The Clash of Civilizations," *Journal of Islamic Studies* 21, no. 3 (2010): 397.
[44] For more details on the first three generation warfare, see Lind et al., "The Changing Face of War: into the Fourth Generation," 23.
[45] Candace de Russy, "The Academy and Fourth Generation Warfare," *Academic Questions* 16, no. 2 (2003): 55.
[46] Lind et al., "The Changing Face of War: into the Fourth Generation," 23.

as 4GW, terrorism has many aspects of 4GW. He also adds that Lind et al. stating "the next real war we fight is likely to be on American soil"[47] resulted in 4GW being seen as prophetic concept after 9/11 attacks.[48]

Another new version of war in recent literature is "hybrid war". Even though the phenomenon of hybrid war is not new, the term and the study of hybrid war is considered as comparatively new. 9/11 attacks and 2006 Israel-Lebanon War are believed to have unique contributions to the hybrid threat studies.[49] According to Frank Hoffman, hybrid war "incorporates a range of different modes of warfare, including conventional capabilities, irregular tactics and formations, terrorist acts including indiscriminate violence and coercion, and criminal disorder".[50] Being inspired by Hoffman, Miroslaw Banasik adds that as a form of combination of different methods, hybrid war is "is a unique form of planned and synchronized impact on the opposite side through military and non-military instruments".[51] At this point, it is important to mention that hybrid war can be conducted not only by states like in the case of the Russian Federation in Ukrainian crisis[52] but also by non-state actors like in the case of Hezbollah in 2006 Israel-Lebanon War.[53]

Increasing importance of non-state actors in armed conflict bring the issue of asymmetric wars which gained more importance and attracted much more attention after the 9/11 attacks.[54] Asymmetric war is generally defined as conflicts in which one side is much more powerful than other side and this results in weaker side's applying non-conventional

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[47] William Lind, John F. Schmitt, and Gary I. Wilson, "Fourth Generation Warfare: Another Look," *Marine Corps Gazette* 78, no. 12 (1994): 37.
[48] Pat Phelan, "Fourth Generation Warfare and its Challenges for the Military and Society," *Defence Studies* 11, no. 1 (2011): 98.
[49] Mehmet Seyfettin Erol and Şafak Oğuz, "Hybrid Warfare Studies and Russia's Example in Crimea," 9, no. 17 (2015): 266.
[50] Frank G. Hoffman, *Conflict in the 21st Century: The Rise of Hybrid Wars* (Virginia: Potomac Institute for Policy Studies, 2007), 14.
[51] Miroslaw Banasik, "Russia's Hybrid War in Theory and Practice," *Journal on Baltic Security* 2, no. 1 (2016): 157-58.
[52] For more details, see Mark Galeotti, "Hybrid, ambiguous, and non-linear? How new is Russia's 'new way of war'?," *Small Wars & Insurgencies* 27, no. 2 (2016).
[53] For more details, see Hoffman, *Conflict in the 21st Century: The Rise of Hybrid Wars*, 35-42.
[54] Josef Schroefl and Stuart J. Kaufman, "Hybrid Actors, Tactical Variety: Rethinking Asymmetric and Hybrid War," *Studies in Conflict & Terrorism* 37, no. 10 (2014): 862.

tactics to achieve its goals.[55] According to Michael Lacewing, what makes it different than "normal" or symmetric war is that there might be significant power difference between states or one side of the conflict might be a non-state actor.[56] At this point, Marwan Bishara reminds that asymmetry should not only be seen as "a quantitative difference in firepower and force" but as "the qualitative difference in the means, values and style of the new enemies".[57] Therefore, (former U.S. Congressman) Ike Skelton, who was one of the key experts on national defense and the chairman of the U.S. House Committee on Armed Services from 2007 to 2011, defines asymmetric war as "one force deploying new capabilities that the opposing force does not perceive or understand, conventional capabilities that counter or overmatch the capabilities of its opponent, or capabilities that represent totally new methods of attack or defense or a combination of these attributes".[58] Josef Schroefl and Stuart J. Kaufman add that even though it has existed for decades, the terrorist attacks of 9/11 and aftermath resulted in renewed attention to asymmetric war.[59]

Similarly, Eric Heinze and Brent Steele also highlights the importance of non-state actors having ever-increasing importance in armed conflict. As a result, they question the prevailing normative structure which aims to establish moral obligations on the use of armed force. Because, this state-centric structure does not apply to non-state actors. This, in return, leads to the questioning point of how this structure is affected by non-state actors. Thus, they offer that the ethical dilemmas of non-state actors should also be clarified within normative structure.[60]

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[55] Jeffrey P. Whitman, "Is Just War Theory Obsolete?," in *Routledge Handbook of Ethics and War: Just War Theory in the Twenty-first Century*, ed. Nicholas G. Evans Fritz Allhoff, Adam Henschke (New York: Routledge, 2013), 24-25.
[56] Michael Lacewing, "Political Philosophy - Nation States," in *Philosophy for A2: Unit 3: Key Themes in Philosophy* (London: Taylor & Francis, 2010), 138.
[57] Marwan Bishara, "An Enemy with No Forwarding Address," Le Monde Diplomatique, accessed January 25, 2017. http://mondediplo.com/2001/10/03asymmetry.
[58] Ike Skelton, "America's Frontier Wars: Lessons for Asymmetric Conflicts," *Military Review* 94, no. 4 (2014): 78-79.
[59] Schroefl and Kaufman, "Hybrid Actors, Tactical Variety: Rethinking Asymmetric and Hybrid War," 862.
[60] Eric A. Heinze and Brent J. Steele, "Introduction: Non-state Actors and the Just War Tradition," in *Ethics, Authority, and War: Non-State Actors and the Just War Tradition* (New York: Palgrave Macmillan, 2009), 1-9.

1.2 TERRORISM

There are more than hundreds of definitions of terrorism. According to J. B. S. Hardman, terrorism is a method which organized individuals use in order to reach their political aims through systematic use of violence.[61] From the same vein, Walter Laqueur defines terrorism as "the sub-state application of violence or threatened violence intended to sow panic in a society, to weaken or even overthrow the incumbents, and to bring about political change".[62] Inspired by T. P. Thornton studies, P.R. Neumann and M. L. R. Smith describe terrorism as "the deliberate creation of a sense of fear, usually by the use or threat of use of symbolic acts of physical violence, to influence the political behavior of a given target group".[63]

Table 1 Frequencies of Definitional Elements in 109 Definitions of 'Terrorism'

	Element	Frequency (%)
1	Violence, force	83.5
2	Political	65
3	Fear, terror emphasized	51
4	Threat	47
5	(Psychological) effects and (anticipated) reactions	41.5
6	Victim–target differentiation	37.5
7	Purposive, planned, systematic tactic	32
8	Method of combat, strategy, tactic	30.5
9	Extra-normality, in breach of accepted rules, without humanitarian constraints	30
10	Coercion, extortion, induction of compliance	28
11	Publicity aspect	21.5
12	Arbitrariness; impersonal, random character, indiscrimination	21
13	Civilians, non-combatants, neutrals, outsiders as victims	17.5
14	Intimidation	17
15	Innocence of victims emphasized	15.5
16	Group, movement, organization as perpetrator	14
17	Symbolic aspect, demonstration to others	13.5

Source: Alex Peter Schmid, "The Definition of Terrorism" in *The Routledge Handbook of Terrorism Research*. ed. Alex Peter Schmid. London: Routledge, 2011, p. 74.

Similarly, Bruce Hoffman states that it as "the deliberate creation and exploitation of fear through violence or the threat of violence in the pursuit of political change".[64] Hoffman

[61] Quoted in Joseph J. Easson and Alex P. Schmid, "250-plus Academic, Governmental and Intergovernmental Definitions of Terrorism," in *The Routledge Handbook of Terrorism Research*, ed. Alex Peter Schmid (London: Routledge, 2011), 100.
[62] Walter Laqueur, "Terrorism," in *Security Studies : A Reader*, ed. Christopher W. Hughes and Yew Meng Lai (London: Routledge, 2011), 417.
[63] P.R. Neumann and M.L.R. Smith, "Introduction," in *The Strategy of Terrorism: How it Works, and Why it Fails* (New York: Routledge, 2008), 8.
[64] Hoffman, *Inside Terrorism*, 40.

elaborates it by adding that terrorism is inevitably political and violent, targets more than its immediate victims with a known chain of command or cell structure of subnational group or non-state actor.[65] At this point, targeting more than immediate victims plays a key role. Because, terrorists are well aware of the fact that by reaching out to the target audience through immediate victims, they might get the maximum gain for the desired results. Therefore, "one of the most important aims of a terrorist attack is to gain publicity for a particular cause. In some cases, publicity is the sole aim."[66]

Paul Rogers acknowledges the element of targeting more than immediate victims as the fundamental point of terrorism and finds Grant Wardlaw's definition as a complete one[67] which is:

> (Political) terrorism is the use, or threat of use, of violence by an individual or a group, whether acting for or in opposition to established authority, when such action is designed to create extreme anxiety and/or fear-inducing effects in a target group larger than the immediate victims with the purpose of coercing that group into acceding to the political demands of the perpetrators.[68]

However, it is not possible to point out a universally accepted version of it as a result of which terrorism continues to be a matter of ongoing discussion.[69] Neumann and Smith add that the definitional problem of terrorism stems from its not being a value-neutral definition.[70] Wardlaw states that the famous phrase "one man's terrorist is another man's freedom fighter" contains difficulties of terrorism definition.[71] Further, he adds that these difficulties stem from terrorism's being a moral problem meaning that an act may or may not be considered as terrorist act according to any particular observer. So, he suggests that a decent study of terrorism should focus on explaining the acts of violence, not justifying them.[72] Similarly, James M. and Brenda J. Lutz state that people tend to see violence as

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[65] Ibid.
[66] Grant Wardlaw, "Terrorism and the Media: A Symbiotic Relationship?," in *Political Terrorism: Theory, Tactics and Counter-Measures* (New York: Cambridge University Press, 1989), 76.
[67] Paul Rogers, "Terrorism," in *Security Studies: An Introduction*, ed. Paul Williams (New York: Routledge, 2013), 173-74.
[68] Wardlaw, "An Introduction to Political Terrorism," in *Political Terrorism: Theory, Tactics and Counter-Measures*, 16.
[69] Lord Alex Carlile, *The Definition of Terrorism: A Report by Lord Carlile of Berriew Q.C. Independent Reviewer of Terrorism Legislation* (Home Office: March 15, 2007), https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/228856/7052.pdf.
[70] Neumann and Smith, "Introduction," in *The Strategy of Terrorism: How it Works, and Why it Fails*, 7.
[71] Wardlaw, "An Introduction to Political Terrorism," in *Political Terrorism: Theory, Tactics and Counter-Measures*, 3.
[72] Ibid., 4-5.

terrorism if they disagree with the perpetrators while they consider the same kind of violence as just cause for freedom fighters. Because of this reason, it is quintessential to have a definition of terrorism regardless of the perpetrators, targets, supporters or opponents.[73] Ekaterina Stepanova points out the difficulty in definition of terrorism with its being highly politicized, as a result of which political atmosphere and point of view of people lead to different interpretations.[74] This is why former Lebanese President criticizes war on terror by stating "it is not enough to declare war on what one deems terrorism without giving a precise and exact definition".[75]

1.2.1. Evolution of Terrorism

Even though there is still an ongoing discussion about what terrorism is, terrorism has existed since the dawn of humanity and evolved from local events to international activities as a consequence it has become something experienced by many individuals and states.[76] Jeffrey Ian Ross presents three main periods of terrorism each of which has its own characteristic, motivation and ideological points. These are ancient, modern and contemporary terrorism. Briefly, ancient terrorism is presented as the first form of terrorism, notably including the Sicarii and the Assassins, covering the period of A.D. 66-1870. Modern terrorism, on the other hand, covers the period from 1871 to 1960. For Ross, leftist revolutionaries were predominant actor of modern terrorism and then right-wing and nationalist-separatist groups became dominant actors following the end of World War I (WWI). Finally, contemporary terrorism covers the period from 1960 to the present day terrorism. The most important aspect of this period is that there has been a huge increase in the number of terrorist incidents. Thus, terrorism has become more lethal and sophisticated and better organized.[77]

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[73] James M. Lutz and Brenda J. Lutz, "What is Terrorism?," in *Terrorism: The Basics* (New York: Routledge, 2011), 1.
[74] Ekaterina Stepanova, *Terrorism in Asymmetrical Conflict: Ideological and Structural Aspects* (Stockholm International Peace Research Institute Research Report No. 23, 2008).
[75] "Beirut Wants 'Terrorism' Defined," Al Jazeera, last modified January 13, 2004, accessed October 23, 2016. http://www.aljazeera.com/archive/2004/01/200841010738460226.html.
[76] Jeffrey Ian Ross, "Introduction," in *Will Terrorism End?* (New York: Chelsea House, 2006), 14.
[77] Ibid., 14-30.

Having comprehensive knowledge on terrorism, David Rapoport states that lineage of terrorism, as a phenomenon, dates back to ancient times, even to primitive societies.[78] However, he adds, the concept of terrorism is produced by the French Revolution which meant "government by intimidation'' or ''a policy intended to strike with terror those against whom it is adopted".[79] After nearly a hundred years later, *Narodnaya Volya* (the People's Will, 1879) characterized itself as terrorist, evaluated terrorism as a provisional requirement to enhance the consciousness of people and assassinated victims for symbolic and political reasons. Even though political aims of terrorism were not achieved immediately, this created a "culture of terror" for next generations to develop.[80]

At this point, Rapoport offers four waves of terrorism each of which has its specific characters, predominant objectives, special tactics and places which are shaped by the evolution of technology, communication and transportation. Even though there are four different waves, these are not completely different ones. Instead, these waves have overlapping points, which manage to exist in the following wave.[81] However, there is a "normal" level of terrorism between waves. As a result, terrorist groups do not necessarily have to be a part of a wave.[82]

The first of these waves is "the anarchist wave: assassination". The first wave dates back to 1879 when reforms of Alexander II could not satisfy hopes of Russians revolutionaries. As a result of disappointment stemming from reforms, revolutionaries seek a new way to put in place of mob: terrorism. Thus, as the name of wave suggests, assassination campaigns targeting important figures started and even Alexander II himself was assassinated. This approach was also used by Italian anarchists in Argentina, France, Spain and in the U.S. As a prominent example, Italian anarchist Michele Angiolillo assassinated Spanish Prime Minister Canova Del Castillo as a result of Castillo harsh approach towards arrest and tortures of anarchists.[83] Later on, Gaetano Bresci, an Italian

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[78] David C. Rapoport, "Terrorism," in *Encyclopedia of Violence, Peace, & Conflict (Second Edition)* (Oxford: Academic Press, 2008), 2089.
[79] Ibid.
[80] Ibid.
[81] Ibid., 2091-92.
[82] Mark Sedgwick, "Inspiration and the Origins of Global Waves of Terrorism," *Studies in Conflict & Terrorism* 30, no. 2 (2007): 98.
[83] Rapoport, "Terrorism," in *Encyclopedia of Violence, Peace, & Conflict (Second Edition)*, 2092.

anarchist, assassinated King Umberto I of Italy in 1900, which inspired Polish-American anarchist Leon Czolgosz who assassinated the U.S. President William McKinley in 1901.[84] This kind of approach was seen also in newly independent states in the Balkans. As a member of terrorist group the Black Hand, Gavrilo Princip assassinated Archduke Franz Ferdinand of Austria and his wife in 1914 which became the catalyst event for WW I.[85]

The second wave is "the anticolonial wave: the first successes". The Versailles Peace Treaty ended WWI and started new wave. Victors of the war used principle self-determination for defeated empires while unconsciously undermining their own authorities. The most prominent example was Free Irish State (1922) of Irish Republican Army (IRA), even though there are several failed uprisings in India, Cyprus and Palestine before the World War II (WWII). With the end of WWII, many mandates became states such as India, Morocco, Pakistan, Ghana, Burma, etc., not particularly as a result of terrorism. However, there were terror campaigns in some mandates. For example, the Irgun fought for the cause of gaining the whole Palestinian mandate for Jews. And the Irgun defined itself as "freedom fighters" which was claimed to emphasize its purpose.[86] IRA continued its struggle with the hope of gaining Northern Ireland.[87] *Ethniki Organosis Kyprion Agoniston* (National Organization of Cypriot Struggle, EOKA) claimed to fight against the British rule in the island.[88] *The Front de Liberation National* (National Liberation Front, FLN) fought for the independent Algeria. While achieving their aims, terrorism of the new wave employed new tactics by targeting military and police forces and using guerilla tactics instead of assassinations. Atrocities of terrorists, in return, resulted in counter-atrocities by military and police forces as a result of which social support for terrorists increased as they were perceived as weak side against law enforcers. In addition, terrorists were not directly targeting civilians. Instead, they were warning

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[84] Jennifer Guglielmo, "Anarchist Feminists and the Radical Subculture," in *Living the Revolution: Italian Women's Resistance and Radicalism in New York City, 1880-1945* (North Carolina: University of North Carolina Press, 2010), 144.
[85] Bryan Brown, "World History," *Junior Scholastic* 116, no. 13 (2014): 8.
[86] David C. Rapoport, "It Is Waves, Not Strains," *Terrorism and Political Violence* 28, no. 2 (2016): 219.
[87] Rapoport, "Terrorism," in *Encyclopedia of Violence, Peace, & Conflict (Second Edition)*, 2093.
[88] However, EOKA is believed to have had a second aim which is as import as independence. This aim was enosis which is the desire for the unification of the island with Greece. *Republic of Cyprus* (Background Notes on Countries of the World 2003, Superintendent of Documents, April 6, 2003).

civilians in order to limit civilian casualties which was a method introduced by the Irgun. Another important character of the second wave is that diasporas paid close attention to issues in their kindred countries.[89] And the UN, with the increasing number of anti-colonial members, supported independence and contributed the success of the wave as well as the U.S. and the Soviet Union.[90]

The third wave is "the new left wave: excessive internationalism". This wave started to be shaped in late 1960s with the turning point of the Vietnam War which made the U.S. and its values main target of the wave. Weather Underground in the U.S., Red Brigades in Italy, Red Army Faction in Germany, and Direct Action in France characterized themselves as the initiators of the revolutionary of "Third World". As these were anti-Western actions, the Soviets covertly supported these movements. This new wave of terrorism was sometimes in relation with separatist movements, like in the case of the *Euskadi Ta Askatasuna* (Basque Nation and Liberty, ETA) and the Palestine Liberation Army (PLO). The most important aspect of the wave was that terrorism has become international as actions of this wave transcended national borders, focused on target with international significance and were conducted by terrorist groups belonging to different nationalities. Hostage incidents and airline hijacking dominated the wave, such as hostage taking of Italian Prime Minister Aldo Moro.[91]

Finally, the fourth wave is "the religious wave: a different kind of internationalism". As a result of revolutionaries being defeated one by one, elimination of PLO facilities which were used by different terrorist groups for training, and increasing effectiveness of international cooperation against terrorism slowly closed the third wave. However, the Iranian revolution, the Camp David Accords and the invasion of Afghanistan by the Soviets brought a new wave. Even though religious elements had existed in earlier waves, religion was not the center of the struggle. Aims and tactics of this wave were justified with religion, and the ultimate aim was creation of religious states. Sikhs in India fought for their religious state within Punjab; Jewish terrorists tried to blow up Al-Aqsa Mosque and waged terrorist campaign against the Palestinians; "Christian Identity" in the U.S.

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[89] Rapoport, "Terrorism," in *Encyclopedia of Violence, Peace, & Conflict (Second Edition)*, 2093.
[90] Rapoport, "It Is Waves, Not Strains," 220.
[91] Rapoport, "Terrorism," in *Encyclopedia of Violence, Peace, & Conflict (Second Edition)*, 2094.

conducted terrorist acts by claiming to interpret the Bible correctly. Aum Shinrikyo went even further and used nerve gas on Tokyo subways in 1995 when Christian violence peaked with the Oklahoma City Bombing. However, the number of active terrorist groups dramatically declined from nearly 200 in 80s to 40 in 90s as a result of religious communities' being more comprehensive than most of the national groups.[92]

Table 2 Rapoport's Four Waves of Terrorism

Focus	**Anarchists 1870–1910s**	**Nationalist 1920s–1960s**	**New Left/Marxist 1960s–1990s**	**Religious 1970s–**
Primary strategy	Elite assassinations	Guerrilla attacks on police and military	Hijackings, kidnappings, assassination	Suicide bombings
Target identity	Primarily European states	European empires	Governments in general; increasing focus on U.S.	U.S., Israel, and secular regimes with Muslim populations
Precipitant	Failure or slowness of political reform	Post-1919 delegitimization of empire	Viet Cong successes	Iranian Revolution, Soviet invasion of Afghanistan
Special characteristics	Developed basic terrorism strategies and rationales	Increased international support (UN and diasporas)	Increased international training, cooperation, sponsorship	Casualty escalation, Decline in the number of terrorist groups

Source: *Jean Elizabeth Rosenfeld.* Terrorism, Identity, and Legitimacy. The Four Waves Theory and Political Violence. *New York: Routledge, 2011. p. 16*

The most important character of the wave was the introduction of suicide bombing for terrorist purposes which was used within military context. This approached revived the first wave assassins' martyrdom concept, which was not preferred in the second and third waves in which killing from distance was much more preferable. Hezbollah's suicide bombing attacks in Lebanon resulted in death of 241 U.S. marines and 58 French soldiers leading to withdrawal of the U.S. and French forces. This signified the importance and success of suicide bombing as a result of which other terrorist groups applied same method. For example, Tamil Tigers of Sri Lanka, most of whom were Hindus, is believed to make more suicide bombings than all Islamic terrorist groups between 1983 and 2000. By taking the method even further, Al Qaeda made suicide bombings both at sea and in

[92] David C. Rapoport, "The Four Waves of Modern Terrorism," in *Attacking Terrorism: Elements of a Grand Strategy*, ed. Audrey Kurth Cronin and James Ludes (Washington, DC: Georgetown University Press, 2004), 142.

the air. *USS Cole* and 9/11 attacks were the most prominent example of al Qaeda's suicide bombing approach, respectively.[93]

As one of the most important terrorist groups of the wave, Al Qaeda, a terrorist organization emerging from the Afghan War, firstly fought against the Soviets who invaded Afghanistan. It has recruits from all over the world who are called as *mujahideen* ("fighters for God") and mostly share the Jihadist–Salafist belief. After the Soviets, al Qaeda tried to unify the Muslim world but failed. As a result, al Qaeda focused on outside influence: the U.S. In addition to above mentioned attacks to the US, al Qaeda attacked the U.S. embassies in Kenya and Tanzania as well as the U.S. military posts in Saudi Arabia and Yemen. These attacks dramatically increased the visibility of al Qaeda among many terrorist groups. However, this visibility could not help al Qaeda achieve its ultimate goal of unifying the Muslim world and al Qaeda tried harder with a desperate attempt of 9/11 attacks to achieve its ultimate goal. Instead of unifying the Muslim world, al Qaeda unified the whole world against itself after former the U.S. President George W. Bush declared war on terror following 9/11 attacks.[94]

1.2.2. Nuclear Terrorism

As a result of this evolution, terrorism has become more lethal and much more destructive. Especially after the 9/11 attacks, it is believed that terrorism will make use of WMD sooner or later in parallel with their objectives.[95] It is also stated in NATO's 2010 Strategic Concept Article 10 that terrorism continues to pose direct threat to NATO and global security, and would increase its impact with chemical, biological, radiological and nuclear (CBRN) capabilities.[96] From this point, nuclear and radiological devices might be very attractive for terrorists in order to create mass casualties as well as to attract

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[93] Rapoport, "Terrorism," in *Encyclopedia of Violence, Peace, & Conflict (Second Edition)*, 2094-97.
[94] Ibid., 2096.
[95] Ian Bellany, "Introduction," in *Terrorism and Weapons of Mass Destruction: Responding to the Challenge*, ed. Ian Bellany (New York: Routledge, 2007), 10.
[96] "Active Engagement, Modern Defence," North Atlantic Treaty Organization, last modified May 23, 2012, accessed July 9, 2017. http://www.nato.int/cps/on/natohq/official_texts_68580.htm.

massive media attention.[97] Because, as mentioned earlier, the 9/11 attacks showed that terrorism is a clear and present threat that has no limitations. As a breaking point for terrorism, the 9/11 attacks showed also willingness of terrorists to cause as much as possible level of lethality and destruction which is why Herald Müller calls it as "mega terrorism".[98]

Nuclear terrorism is believed to be the only form of terrorism having potential of causing deaths of thousands of people in a single terrorist act because of its incomparable potential level of destruction.[99] And as for definition, within the shadow of not having a universal definition of terrorism, nuclear terrorism is briefly "the use or threat of use of a nuclear explosive device of any type by an individual or a group for terrorist purposes".[100] Unlike this brief definition, Alex Schmid offers a comprehensive one for as following:

> nuclear terrorism is the use, or credible threat of use, of destructive force against noncombatant/civilian targets for purposes of propaganda, blackmail/extortion or intimidation of a target audience, whereby;
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> a) the perpetrator has managed to trigger a fission (or fission/fusion) of nuclear material,
>
> b) is credibly held to be in possession of weapon-grade nuclear (U, Pu) material and signals intent of first use; or
>
> c) is attacking or sabotaging nuclear reactors or vital support systems (e.g. cooling system) at power stations or nuclear materials (e.g. reactor rods or high-radiation level waste) in transport or at storage sites in order to produce, then or later, an accident or a controlled release/explosion of radioactive substances, or
>
> d) disperses in water, soil or air radioactive waste or isotopes, etc. by conventional explosion or dispersion/diffusion.[101]

According to Schmid, nuclear weapons are already terrifying by nature. So, unlike state actors who are subject to retaliation of various forms, if non-state actors possess these destructive forces, terrorism part of the action is likely to be even larger.[102] According to Graham Allison, the world has faced increased threat of nuclear terrorism since the end

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[97] James J.Wirtz, "Introduction: Nuclear Weapons," in *Weapons of Mass Destruction: An Encyclopedia of Worldwide Policy, Technology, and History*, ed. Eric A. Croddy and James J.Wirtz (California: ABC-CLIO, 2005), XXV.
[98] Müller, *Terrorism, Proliferation: A European Threat Assessment*, 7.
[99] Allison, "Nuclear Terrorism: The Ultimate Preventable Catastrophe," 99.
[100] Bunn et al., *The U.S.-Russia Joint Threat Assessment of Nuclear Terrorism*, 13.
[101] Alex P. Schmid, "Nuclear Terrorism: How Real is the Threat? Keynote Address," in *Measures to Prevent, Intercept and Respond to Illicit Uses of Nuclear Material and Radioactive Sources* (Vienna: International Atomic Energy Agency, Office of Physical Protection and Material Security, 2002), 16.
[102] Ibid.

of Cold War even though some deny even the possibility of a nuclear terrorist act.[103] From a similar point of view, former US President Barrack Obama stressed the importance of nuclear terrorism in his speech in Prague in 2009 during the 60th anniversary of the NATO. In the speech which is seen as the "the first big foreign policy speech of his presidency" and as his presidential doctrine for nuclear-free world,[104] Obama stated that even though the Cold War has gone, weapons of that era has continued to exist. Further, he added the end of the Cold War led to decrease the threat of nuclear war, while the possibility and risk of nuclear attack from either state or non-state actors has increased since. Also, speaking hours after North Korea's launching long-range missile, he highlighted that new states' having nuclear weapons, nuclear testing and black market trade as well as terrorists' determination to acquire nuclear weapon have all contributed the increase of this risk. Then, he pointed out that although there is nuclear nonproliferation regime which is the cornerstone of the efforts for preventing nuclear proliferation, this regime may not answer all the needs as long as more people and states violate the rules.[105] As a result, this requires states to cooperate against this non-state level threat within a different framework than traditional state-level threat oriented nuclear nonproliferation regime.

Even though there were existing mechanisms for the physical protection of nuclear materials, the post-Cold War period, especially the 9/11 attacks, resulted in a new attention towards nuclear terrorism and led nuclear security to become the preferred term for means to prevent it.[106] As response to the threat of nuclear terrorism, states have focused on nuclear security which 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".[107] Actually, the term "nuclear security" was used for "efforts made by Cold War adversaries to ensure the arms race would not end in accidental nuclear disaster" at first but has evolved since

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[103] "Graham T. Allison: the Congenital Optimist," *Bulletin of the Atomic Scientists* 66, no. 5 (2010): 5.
[104] Ian Traynor, "Barack Obama Launches Doctrine for Nuclear-free World," Guardian, last modified April 5, 2009, accessed April 16,2017. https://www.theguardian.com/world/2009/apr/05/nuclear-weapons-barack-obama.
[105] Obama, "Remarks By President Barack Obama In Prague As Delivered."
[106] Duyeon Kim and Jungmin Kang, "Where Nuclear Safety and Security Meet," *Bulletin of the Atomic Scientists* 68, no. 1 (2012): 88.
[107] "Concepts and Terms."

then into the current meaning.[108] Nuclear security covers a wide range of activities related to legislation, regulation and administration such as technical hardware and software systems, intelligence gathering, threat assessment, training, operation and maintenance of security systems and response capabilities.[109]

On the other hand, there is nuclear safety which is "the achievement of proper operating conditions, prevention of accidents and mitigation of accident consequences, resulting in protection of workers, the public and the environment from undue radiation hazards".[110] As it can be seen in definitions, nuclear safety is related to the protection *of* people and environment while nuclear security is related to protection *from* malicious people.[111] However, these two co-existing terms reinforce each other in direction for common objective to limit risk.[112] Because, nuclear safety problems would be exploited in order to create nuclear security problems. On the other hand, nuclear safety and security can be enhanced simultaneously by improving essential parts such as power supplies and cooling systems. This is why Duyeon Kim and Jungmin Kang thinks that a combined nuclear safety-security approach might be better to ensure that nuclear facilities cause no harm to the public.[113]

There are various instruments that strengthen nuclear security which will be evaluated in details in Chapter II. Apart from these instruments, there is a developing approach towards nuclear security culture which is "the assembly of characteristics, attitudes and behavior of individuals, organizations and institutions which serves as a means to support and enhance nuclear security".[114] In spite of developing slowly, it constitutes one of the most important approach towards nuclear terrorism. Because, the more nuclear security culture is developed, the more security of radioactive material and associated facilities

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[108] Jack Boureston and Tanya Ogilvie-White, *Seeking Nuclear Security through Greater International Coordination* (Council on Foreign Relations, International Institutions and Global Governance Program, March 2010).
[109] *Nuclear Security Culture*, *IAEA Nuclear Security Series, 7* (Vienna: International Atomic Energy Agency, 2008), 4.
[110] "Concepts and Terms."
[111] According to Turkish Atomic Energy Authority (TAEK), nuclear safety is translated as "nükleer güvenlik" whereas nuclear security is translated as "nükleer emniyet". For more details, see http://www.taek.gov.tr/nukleer-guvenlik/nukleer-guvenlik.html.
[112] *Nuclear Security Culture*.
[113] Kim and Kang, "Where Nuclear Safety and Security Meet," 87-89.
[114] *Nuclear Security Culture*, 3.

and transport will be increased.[115] Similarly, Igor Khripunov states that nuclear security functions well with the nuclear security culture.[116] This importance has been reflected in different platforms including international conferences and guidelines, recommendations, and agreements. For example, there is a nuclear security culture enhancing program which started in Russian nuclear facilities and sites in 2002 as a result of bilateral agreement between the Russian and the U.S. governments.[117] Also, the 2005 Amendment to the Convention on the Physical Protection of Nuclear Material (CPPNM) attaches a special importance to the nuclear security culture by stating "[a]ll organizations involved in implementing physical protection should give due priority to the (nuclear) security culture, to its development and maintenance necessary to ensure its effective implementation in the entire organization".[118]

1.3. THEORETICAL BACKGROUND TO COOPERATION

In IR theories, there are different explanations for cooperation, non-state actors and institutions. These different explanations shape approaches towards the solution of common problems such as nuclear terrorism. As it has been mentioned, terrorism has gained an international characteristic which also applies to nuclear terrorism. Therefore, nuclear terrorism, by its nature and potential consequences, is not a challenge only for one state but for all states which requires states to cooperate against the challenge. In fact, states have already been cooperating through various international mechanisms which will be reviewed in chapter 2. While reviewing these efforts and offering a more effective framework for these, the thesis will benefit from the IR theories, especially the Regime Theory which offers solutions for mutual problems.

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[115] Ibid., v.
[116] Igor Khripunov, "Nuclear Security: Attitude Check," *Bulletin of the Atomic Scientists* 61, no. 1 (2005): 58.
[117] Nikolay I. Geraskin et al., "Nuclear security culture enhancement: the role of culture coordinators at Russian nuclear sites," *Defense & Security Analysis* 31, no. 4 (2015): 330.
[118] Fundamental Principle F, *Amendment to the Convention on the Physical Protection of Nuclear Material* (2005), https://www.iaea.org/sites/default/files/infcirc274r1m1.pdf.

1.3.1. Realism

Realism, distinguished character of which stems from domination of international relations and its heritage dating back to ancient Greece,[119] and its strands argue that the state is the main actor[120] and international relations focus on relations of states. As the main actor, the most important and first goal of the state is survival which "cannot be compromised or put to risk".[121] And the state is assumed to be unitary rational actor in a competitive international arena where it is severely penalized if it is less skillful than others.[122] Some Realists, Classical Realists, places human nature as the reason for endless struggle for power, while other Realists, Neo-realists, benefits from structural explanations for the same purpose. Also, there is no higher authority to regulate state relations which is anarchy. However, it does not mean chaos or disorder, but the opposite of hierarchy simply meaning ordering principle of internal politics.[123] So, in this kind of environment where there is struggle for power and anarchy, "self-help is necessarily the principle of action".[124] This means that states should rely only on themselves to provide security.

However, while achieving one's own security, that state causes insecurity for other states. This stems from the fact that other states cannot be sure about that state's security intention whether it is for defensive or offensive purposes. Because, it is not easy for states to trust each other and there is always suspicion about intentions in anarchic environment. So, as a result of one state's attempt to increase its military power, other

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[119] Steven Forde, "Varieties of Realism: Thucydides and Machiavelli," *Journal of Politics* 54, no. 2 (1992): 372.
[120] Hans J. Morgenthau and Kenneth W. Thompson, *Politics Among Nations: the Struggle for Power and Peace*, 6th ed. (New York: Knopf, 1985), 8; Kenneth N. Waltz, *Theory of International Politics* (Massachusetts: Addison-Wesley Pub. Co., 1979), 95.
[121] Henry Kissinger, *American Foreign Policy* (New York: Norton, 3rd ed., 1977), 204.
[122] Kenneth N. Waltz, "Reflections on Theory of International Politics: A Response to My Critics," in *Neorealism and Its Critics*, ed. Robert O. Keohane (New York: Columbia University Press, 1986), 331.
[123] John J. Mearsheimer, "Structural Realism," in *International Relations Theories : Discipline and Diversity*, ed. Tim Dunne, Milja Kurki, and Steve Smith (New York: Oxford University Press, 3. ed., 2013), 79.
[124] Waltz, *Theory of International Politics*, 111.

states also increase their military power and in the end, states feel no more secure than previous level, which is called as security dilemma.[125]

As mentioned above, by placing state as the preeminent actor in international relations, Realists share that international relations are relations of states and consequently, all other actors are less important or not important at all.[126] Thus, Realism attaches less or no importance to other actor of international relations such as intergovernmental organizations (IGOs), non-governmental organizations (NGOs), and individuals. Similarly, Joseph M. Grieco highlights that states in anarchy rarely manages to cooperate even for common interests and international institutions have only marginal effects on cooperation.[127] John J. Mearsheimer shares a similar point by stating "Realists maintain that institutions are basically a reflection of the distribution of power in the world. They are based on the self-interested calculations of the great powers, and they have no independent effect on state behavior. Realists therefore believe that institutions are not an important cause of peace. They matter only on the margins".[128]

Mearsheimer also adds that cooperation among is limited because of the logic of security competition. However, he does not deny the existence of cooperation among states. He sees cooperation something sometimes difficult to achieve and always difficult to sustain for relative gains concerns and possibility of cheating.[129] From a similar point of view, after highlighting the importance of anarchy, survival, and self-help international atmosphere, Grieco states that the most important of aspect of any state relationships is related to relative gains, not to absolute gains.[130] Therefore, he adds that as states face problems of cheating and relative gains, states cooperate by hoping both that others abide

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[125] John H. Herz, "Idealist Internationalism and the Security Dilemma," *World Politics* 2, no. 2 (1950): 157.
[126] Robert H. Jackson and Georg Sørensen, "Realism," in *Introduction to International Relations: Theories and Approaches* (Oxford: Oxford University Press, 2013), 66.
[127] Joseph M. Grieco, "Anarchy and the Limits of Cooperation: A Realist Critique of the Newest Liberal Institutionalism," *International Organization* 42, no. 3 (1988): 488.
[128] John J. Mearsheimer, "The False Promise of International Institutions," *International Security* 19, no. 3 (1994): 7.
[129] Ibid., 9-13.
[130] Grieco, "Anarchy and the Limits of Cooperation: A Realist Critique of the Newest Liberal Institutionalism," 496-98.

by their commitments and this cooperation leads to "balanced" or "equitable" outcomes.[131]

1.3.2. Liberalism

As opposed to Realism, Liberalism and its many strands, starting in the seventeenth century with John Locke, reflect a positive vision of human nature, belief in progress and cooperation in international relations. Similarly, Liberals, such as Jeremy Bentham, believes in human capacity and rational thinking, and supports the idea that rational understanding "will inevitably govern the relations between states as well as within states".[132] In addition, Liberalism believes in progress because Liberals consider that when the ideas are free, it will slowly transform international relations to push for greater human freedom by creating infrastructure for peace, justice and prosperity.

Liberalism recognizes the great potential for human progress which could succeed in states that ensure individual liberty. As John Locke mentions, states exist to ensure the liberty of citizens which, in return, make it possible for them to live and pursue their happiness.[133] Thus, individual liberty is central to Liberalism and the power of human reason carries the same high-level value. Individuals are equal before the law and have some certain essential rights such as education, access to free press and religious toleration. States have the responsibility to protect these rights through the law. Because, the only justifiable form of government is the one which is ruled according to the law according to Immanuel Kant who defined these as "republican governments".[134] However, Kant also pointed out that the situation of international relations which have lawless atmosphere, unstable power balance and ever-existing possibility of war imperils the liberal order.[135] Therefore, Kant suggested that "a world of 'republics' could

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[131] Ibid., 501.
[132] Michael Joseph Smith, "Liberalism and International Reform," in *Traditions of International Ethics*, ed. Terry Nardin and David Mapel (Cambridge: Cambridge University Press, 1992), 203.
[133] Jackson and Sørensen, "Liberalism," in *Introduction to International Relations: Theories and Approaches*.
[134] Cornelia Navari, "Liberalism," in *Security Studies: An Introduction*, ed. Paul Williams (New York: Routledge, 2013), 30.
[135] Ibid., 31.

eventually establish 'perpetual peace' in the world".[136] Also, Liberals accept that individuals might be self-interested and competitive. But they also emphasize that their sharing common interest leads to cooperate which is beneficial for everyone. Cooperation among states and other international actors increases the importance of achieving greater human freedom. Unless cooperation happens, there is no possibility of benefitting from interaction, interdependence, and achieving greater peace, welfare and justice.[137]

Like Realism, it is possible to state for Liberalism that there are some strands of the theory such as Commercial, Republican, Sociological and Neo-liberal Institutionalism.[138] These strands have core elements of Liberalism and focus on specific characteristics. Despite existence of different strands, the thesis will focus on only Neo-liberal Institutionalism which concentrates on international cooperation.

Neo-liberal Institutionalism,[139] which is accepted as the strongest challenge to Realist and Neo-realist approach,[140] focuses on achieving cooperation among states and other actors existing in the international system.[141] According to Robert O. Keohane, what cooperation needs is compliance of the actions of different actors in the international system through policy coordination. So, he states that cooperation happens when actors conform their behaviors with others' through negotiations.[142] In the article written with

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[136] Jackson and Sørensen, "Liberalism," in *Introduction to International Relations: Theories and Approaches*, 101.
[137] Tim Dunne, "Liberalism," in *The Globalization of World Politics : an Introduction to International Relations*, ed. John Baylis, Steve Smith, and Patricia Owens (Oxford: Oxford University Press, 2014); Edwin van de Haar, "Liberalism and International Relations Theory," in *Classical Liberalism and International Relations Theory : Hume, Smith, Mises, and Hayek* (New York: Palgrave MacMillan, 2009).
[138] Cited in Steven L. Lamy, "Contemporary Mainstream Approaches: Neo-realism and Neo-liberalism," in *The Globalization of World Politics : An Introduction to International Relations*, ed. John Baylis, Steve Smith, and Patricia Owens (Oxford: Oxford University Press, 2014), 132.
[139] This version of liberal approach is also called as institutional theory, institutional liberalism, neoliberalism or liberal institutionalism. See Robert O. Keohane and Lisa L. Martin, "The Promise of Institutionalist Theory," *International Security* 20, no. 1 (1995); Jennifer Sterling-Folker, "Neoliberalism," in *International Relations Theories: Discipline and Diversity*, ed. Tim Dunne, Milja Kurki, and Steve Smith (New York: Oxford University Press, 3. ed., 2013), 115; Jackson and Sørensen, "Liberalism," in *Introduction to International Relations: Theories and Approaches*, 110; Lamy, "Contemporary Mainstream Approaches: Neo-realism and Neo-liberalism," in *The Globalization of World Politics : An Introduction to International Relations*, 132.
[140] Lamy, "Contemporary Mainstream Approaches: Neo-realism and Neo-liberalism," in *The Globalization of World Politics : An Introduction to International Relations*, 132.
[141] Sterling-Folker, "Neoliberalism," in *International Relations Theories: Discipline and Diversity*, 114.
[142] Robert O. Keohane, "Cooperation and International Regimes," in *After Hegemony: Cooperation and Discord in the World Political Economy* (Princeton: Princeton University Press, 1984), 51.

Lisa L. Martin, Keohane adds that states create institutions when they mutually benefit from cooperation. Because, institutions create an environment in which information is provided, transaction costs are reduced, commitments are more credible. Additionally, institutions can create important points to coordinate and simplify the process of reciprocity.[143]

Like Neo-realism, Neo-liberal Institutionalism offers a state-centric perspective according to which states are unitary, rational and utility maximizers and they are the dominant actors of international system.[144] Even though Liberal Institutionalists share realist assumption of anarchy and importance of the state, they do not see anarchy as an obstacle which can prevent sovereign states from cooperation.[145] They see institutions as mediators and propose that traditional problems of the anarchy, which are lack of trust among states and fear of each other's intentions, can be alleviated through international institutions.[146] It is also supported by Liberal Institutionalists that without existence of a hegemonic player to enforce compliance, cooperation between states can be enhanced. This compliance can be achieved by bringing higher levels of predictability and regularity with international regimes.[147]

Neo-liberal Institutionalists also focus on global governance and globalization. Keohane states that globalization, which is defined as "state of the world involving networks of interdependence at multicontinental distances, linked through flows and influences of capital and goods, information and ideas, people and force",[148] relies on effective governance. He further states that effective governance can happen through interstate cooperation and transnational networks.[149] After the end of the Cold War, states faced new security problems such as international terrorism, proliferation of WMD, internal

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[143] Keohane and Martin, "The Promise of Institutionalist Theory," 41-42.
[144] Sterling-Folker, "Neoliberalism," in *International Relations Theories: Discipline and Diversity*, 115.
[145] Robert O. Keohane, "Reciprocity in International Relations," *International Organization* 40, no. 1 (1986): 1.
[146] Jackson and Sørensen, "Liberalism," in *Introduction to International Relations: Theories and Approaches*, 113.
[147] Scott Burchill, "Liberalism," in *Theories of International Relations* (Hampshire; New York: Palgrave Macmillan, 2005), 65.
[148] Robert O. Keohane and Joseph S. Nye, "Power, Interdependence, and Globalism," in *Power and Interdependence* (Boston: Longman, 2012), 225.
[149] R. Keohane, "Governance in a Partially Globalized World," in *Power and Governance in a Partially Globalized World* (London: Routledge, 2000), 245.

conflicts threatening both regional and global security.[150] In addition, globalization, technological advances and rapid proliferation of actors increased the need for global governance which is not a global government or hierarchical structure but in which power and authority exist in different degrees and ways.[151]

There are more than one kind of actor in global governance. States are still accepted as key actors as well as IGOs which are formed by states to provide coordination. NGOs which are private and voluntary organizations to achieve a common purpose, experts whose knowledge is essential, and multinational corporations which control more resources than some of states are also seen as actors of global governance.[152] Global governance offers many different problem solving arrangements and activities which are established by states and other actors in order to find solutions, administer common purposes and elimination of deficiencies. One of these is international regimes in which "the rules, norms and structures in a specific issue area are linked together".[153]

According to Stephan Krasner, international regimes are "sets of implicit or explicit principles, norms, rules, and decision-making procedures around which actors' expectations converge in a given area of international relations".[154] He adds that regimes are not just temporary arrangements so they do not change in relation to power or interest changes. Thus, he states that regimes should not be thought as agreements because agreements are arrangements that are to be facilitated with regimes.[155] Oran Young sees regimes as social institutions which regulate actions of states regarding specific activities and offers regimes in a similar definition as "recognized patterns of behavior or practice around which expectations converge".[156] Ernst Haas defines regimes as "arrangements peculiar to substantive issue-areas in international relations that are characterized by the

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[150] Lamy, "Contemporary Mainstream Approaches: Neo-realism and Neo-liberalism," in *The Globalization of World Politics : An Introduction to International Relations*, 132-33.
[151] Margaret P. Karns, Karen A. Mingst, and Kendall W. Stiles, "The Challenges of Global Governance," in *International Organizations: The Politics and Processes of Global Governance* (Colorado: Lynne Rienner Publishers, 2015), 2-4.
[152] Ibid., 8-20.
[153] Ibid., 25.
[154] Stephen D. Krasner, "Structural Causes and Regime Consequences: Regimes as Intervening Variables," *International Organization* 36, no. 2 (1982): 186.
[155] Ibid., 186-87.
[156] Oran R. Young, "Regime Dynamics: The Rise and Fall of International Regimes," *International Organization* 36, no. 2 (1982): 277.

condition of complex interdependence: neither hierarchy nor anarchy prevails and states rarely practice self-help".[157] He also highlights that regime, system and order are not the same thing. For him, regimes are man-made social institutions for handling conflicts, whereas order means benefits that will be provided by regime and system means the whole where cooperation towards an order happens.[158] Donald Puchala and Raymond Hopkins, accepting Krasner's definitions, state that international regimes serve the purpose of guiding political action within a system and attach meaning to it.[159]

However, Arthur Stein criticizes broad definitions of regimes as institutions or rules of specific issue activities without giving a definition. Instead, he offers why and when regimes exist. For him, there is no need for a regime as long as each state gets desired results by making independent decisions. However, he adds that regimes arise when states abandon independent decision making for managing dilemmas of common interest and aversion. Making these dilemmas of the reason for regime establishment, he uses dilemmas of common interests for situations that states have common interest to secure a specific outcome and dilemmas for common aversions for situations that states have common interest to prevent a specific outcome.[160] However, Haas states that either a hegemon state creates and maintains a regime in order to universalize its interests or a coalition of weaker states wish to achieve the same. In former version, a regime can be altered or abandoned in relation to hegemon's position and wish. In the latter one, regime stands as long as coalition goes on.[161] Contrary to the hegemonic stability, Young suggests that leadership has a key role in determining the success or failure in formation of international regimes with its power resources and negotiating skills for framing issues. Therefore, he states that "the emergence of leadership is a necessary (but not sufficient) condition for success in efforts to reach agreement on constitutional contracts at the

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[157] Ernst B. Haas, "Words Can Hurt you; Or, Who Said What to Whom about Regimes," *International Organization* 36, no. 2 (1982): 211.
[158] Ibid., 210-11.
[159] Donald J. Puchala and Raymond F. Hopkins, "International Regimes: Lessons from Inductive Analysis," *International Organization* 36, no. 2 (1982): 245-46.
[160] Arthur A. Stein, "Coordination and Collaboration: Regimes in an Anarchic World," *International Organization* 36, no. 2 (1982): 299-311.
[161] Haas, "Words Can Hurt you; Or, Who Said What to Whom about Regimes," 213.

international level".[162] From the same point, it is stated that some states assume the leading role of process, which is believed to be required in various aspects of globalized world, for international cooperation for shared challenges because of their greater diplomatic, economic or military powers. Therefore, these states get more influence and shape the political agenda for creation, observation and enforcement of concerning results.[163]

Similarly, Krasner evaluates regime formation. For him, there are some issues which are included in regime development. Egoistic self-interest, meaning the desire to maximize own utility function, is not concerned with others' behaviors as long as these behaviors do not affect itself. So, from time to time, this self-interest calculation leads states to joint decision making. Political power is also used for regime development. Krasner states that power can be used to ensure optimal results for the whole system meaning promotion of joint maximization. He calls this approach as cosmopolitan and instrumental. Or, he adds, power can be used to intensify values of specific actors which is called as particularistic and potentially consummatory. Norms and principles which are core elements of regime definition are accepted as factors for establishment, persistence and disappearance of regimes. Using Max Weber's Calvinist religious doctrine, it is stated that without Calvinist values of hard work, self-sacrifice, loyalty and honor, capitalist system would crumble. These values are essential constraints on self-interested calculations. So, it is same for regimes that norms and principles prevent states from self-interested calculations. Usage and custom, and knowledge are also important for regime development but these are not accepted as exogenous variables meaning that they are not capable of creating a regime on their own. Usage and customs means regular patterns of behavior and long-standing practice, respectively. So, these lead to shared expectations which are regarded as rule-like or principled behavior of legitimacy. Knowledge, like

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[162] Oran R. Young, "Political Leadership and Regime Formation: On the Development of Institutions in International Society," *International Organization* 45, no. 3 (1991): 281, 307.
[163] Lien Thi Quynh Le, Yoshiki Mikami, and Takashi Inoguchi, "Global Leadership and International Regime: Empirical Testing of Cooperation without Hegemony Paradigm on the Basis of 120 Multilateral Conventions Data Deposited to the United Nations System," *Japanese Journal of Political Science* 15, no. 4 (2014): 525-26.

usage and custom, is regarded as intervening variable and accepted as supplementary and reinforcing variable in relation with above mentioned issues. [164]

Young states that regimes as social institutions are response to coordination problems. However, he adds that it is not quite possible to formulate a uniform development sequence concerning the emergence of international regimes. At this point, he offers three types of order for social institutions two of which could be applied for international regimes. Spontaneous orders are defined as "the product of the action of many men but … not the result of human design".[165] Language systems and natural markets constitute good examples of this type of order. A different class of social institutions are regarded as negotiated orders. This kind of international regimes are defined with intentionally accepting provisions, conscious participation and formal statement of the outcomes. These type of international regimes are most common type of social institutions. The last type of order is imposed orders which are promoted by hegemon power or dominant powers. This type of international regimes, like Haas' hegemon regime, reflects interests of hegemon power or dominant powers. So, consent of subordinate actors is not required but their conformity is provided through mixture of coercion, cooptation and manipulating incentives. This results in hegemon power or dominant powers bearing the responsibilities of the regime.[166]

On the issue of regime change, Puchala and Hopkins offer two kinds of change: evolutionary and revolutionary change. In their approach, regime change is related to interest and power. By evolutionary change, they mean qualitative change which occurs as a result of change in interest, aims and available information. As a result, participants of a regime want to eliminate the dysfunctional act which might be in decision process or in substantive performance of a regime. Thanks to technology and new knowledge, new or changed understanding and capability lead to regime change. But, this kind of change happens within norms of regime and generally there might be minor changes in distribution of powers. On the other hand, revolutionary change occurs as a result of major changes. Puchala and Hopkins adds that most regimes are advantageous for some

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[164] Krasner, "Structural Causes and Regime Consequences: Regimes as Intervening Variables," 194-204.
[165] Quoted in Young, "Regime Dynamics: The Rise and Fall of International Regimes," 282.
[166] For a detailed discussion, see ibid., 282-90.

participants while disadvantageous for others. The latter one abides by rules of regime because of the costs of non-compliance. However, when and if there are alterations in the power structure and costs of non-compliance, the disadvantaged participants might try to reverse the status in line with their statuses. This kind of revolutionary change is characterized with highly political functional regimes, not single issue, specific regimes.[167] Young states that international regimes are not static constructs. On the contrary, they transform in relation to inner dynamics, political, economic and social changes.[168]

According to Krasner, short-term calculations of interest should not constitute the ground for regime-governed behavior. As regimes consist of norms and principles, sense of general obligation is expected to exist. Being one of these principles, reciprocity leads states to abandon their short-term interests. [169] So, Krasner clearly states that regimes arise out of necessity and when they exist, they affect concerning behavior and outcome. Even though he shares the belief that regimes do matter, he adds that there is no general agreement at this point. In addition, he offers three approaches which evaluate whether regime matters or not. The first one is the conventional structural perspective which regards regimes as useless. This view supports the basic idea that if regimes exist, they have no or little impact. They also support that rational self-seeking states function in an interest and power oriented system and these values are resistant to principles, norms, rules and decision-making procedures. The second one is the modified structural perspective. According to this perspective, regimes matters but under certain circumstances. For example, if states cannot achieve desired outcomes by uncoordinated individual behavior, regimes may have an impact. And the third one is Grotian perspective. For this perspective, regimes exist in all areas of political systems. So, regimes are essential parts of human interaction, including interactions in international relations.[170]

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[167] Puchala and Hopkins, "International Regimes: Lessons from Inductive Analysis," 249-50, 74-75.
[168] Young, "Regime Dynamics: The Rise and Fall of International Regimes," 290-91.
[169] Krasner, "Structural Causes and Regime Consequences: Regimes as Intervening Variables," 189-94.
[170] For more details, see ibid.

As it has been stated above, Regime Theory offers guidance on political actions for solving common problems via international regimes. Because, international regimes promote joint decision making and prevent states from self-interested calculations. Unlike Realism and Neo-realism, anarchy does not prevail as complex interdependence create interdependence through international regimes which standardize behavior and create expectations for states. At this point, effectiveness of an international regime is closely related to norms and principles which are the core elements of any international regime. Because, norms and principles are the elements that lead states to abandon individual decision making process for common problems. From this vein, following this theoretical background, the next chapter starts with the international nuclear nonproliferation regime in order to illustrate how an international regime could be effective in practice.

CHAPTER II: NUCLEAR NONPROLIFERATION REGIME AND NUCLEAR SECURITY

This chapter aims to present structure of the international nuclear nonproliferation regime and international responses to the threat of nuclear terrorism. As the last chapter ends with the Regime Theory, this chapter starts with the international nuclear nonproliferation regime and its components. After reviewing each component of this regime, the chapter moves to nuclear security efforts. It provides an evaluation of these international responses while presenting both positive and negative sides of them. By doing so, the chapter reflects how these responses address the threat while also presenting the deficiencies in these responses.

But, before moving forward with the international nuclear nonproliferation regime, it will be helpful to explain why the thesis concentrates on international regimes. As it can be seen through the last section of previous chapter, international regimes "constrain state behavior by formalizing the expectations of each party to an agreement where there is a shared interest"[171] in a given international issue area. As a result, international regimes enhance cooperative habits, oversee compliance and sanction defectors. Unlike Realism that shares the understanding of survival, self-help and struggle for power, international regimes encourage "trust, continuity and stability in a world of ungoverned anarchy".[172] From this vein, as "a highly developed example",[173] the international nuclear nonproliferation regime carries importance for studies concerning not only nuclear issues but also any international regime.

In addition to its general importance, the international nuclear nonproliferation regime has a specific value for the structure of the thesis. Because, as it will be discussed in details in the following sections, this regime grew out of necessity, which peaked during the Cuban Missile Crisis in 1962, to limit the increasing risk of nuclear war between states and nuclear proliferation. Therefore, it could be said that this regime has been a response to the threat stemming from traditional war perspective. And, it has proved its success by

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[171] Burchill, "Liberalism," in *Theories of International Relations*, 65.
[172] Ibid.
[173] "The Global Nuclear Nonproliferation Regime," Council on Foreign Relations, last modified May 21, 2012, accessed May 23, 2017. https://www.cfr.org/report/global-nuclear-nonproliferation-regime.

not only limiting the number of NWSs and preventing a nuclear war up to now but also increasing its number of membership and strength after the end of the Cold War. However, as mentioned in previous chapter, war has become something new that takes both state and non-state actor into the equation. In addition, the security problem in the post-Cold War period is dominated by the threat of terrorism, especially after 9/11. So, as an effective example of an international regime, the international nuclear nonproliferation regime could inspire nuclear security to become more effective to prevent the threat of nuclear terrorism. From this vein, the following part will present the international nuclear nonproliferation regime which has been effective to cope with the threat of proliferation of nuclear weapons to state actors. The reasoning is based on the premises of traditional war, that is, a state which may not be as responsible as great powers and which might easily decide to use nuclear weapons.

2.1 NUCLEAR NONPROLIFERATION REGIME

The international nuclear nonproliferation regime is a universal framework consisting of international agreements and organizations which focus on preventing the spread of nuclear weapons as well as strengthening peaceful use of nuclear energy, arms control and disarmament process.[174] In 1963, then-U.S. President John F. Kennedy predicted that in the midst of 1970s, there would be fifteen to twenty-five state possessing nuclear weapons.[175] A s a result of such concerns in relation to the Cold War arms race, there have been several international mechanisms to promote peaceful use of nuclear energy, prevent nuclear proliferation and provide a basis for nuclear disarmament all of which led to establishment of the international nuclear nonproliferation regime.

The regime consists of several 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

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[174] "What Is It? Why Is It Important?"

[175] When Kennedy made this speech, there were only four states possessing nuclear weapons. John F. Kennedy, "President Kennedy's News Conferences: News Conference 52," John F. Kennedy Presidential Library and Museum, accessed February 18, 2017. https://www.jfklibrary.org/Research/Research-Aids/Ready-Reference/Press-Conferences/News-Conference-52.aspx.

the cornerstone of the regime. [176] Even though there is a misleading inclination to associate the regime only with the NPT, the norms of nonproliferation have evolved thanks to 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.[177]

As being the most remarkable version of regimes with its below mentioned components,[178] the international nuclear nonproliferation regime reflects its importance through its success and its evolutionary structure. The regime serves the purpose of guiding political actions within nuclear issues context. By 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, groups and public-private partnerships.[179] As a result, international rules and laws, which are based on multilateral treaties and customary practices such as the NPT and the CTBT (and possibly the FMCT in future), play a key role in the regime's structure. Because, these kind of laws are important as "the process of negotiation now involves all affected countries".[180] In addition, regional treaties of NWFZs supplement these rules and laws, thus strengthen the regime. Similarly, the IAEA, as an IGO, provides a mechanism for states to shape international debate on nuclear issues and monitors the compliance as well as creating norms of behavior. These international norms are "shared expectations or understandings regarding standards of appropriate behavior".[181] In few words, all these rules, laws, international mechanisms and norms as well as groups such as the CD, the ZAC and the

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[176] Arian L. Pregenzer, "Evolution and Resilience of the Nuclear Nonproliferation Regime," *AIP Conference Proceedings* 1596 (2014): 152.
[177] Cristian De Francia, "Enforcing the Nuclear Nonproliferation Regime: The Legality of Preventive Measures," *Vanderbilt Journal of Transnational Law* 45, no. 3 (2012): 714.
[178] Şebnem Udum, "The Role of Turkey in the 2015 NPT Review Conference," *Ekonomi ve Dış Politika Araştırma Merkezi, EDAM* Discussion Paper Series, 2015/1 (May 4, 2015): 3.
[179] Karns, Mingst, and Stiles, "The Challenges of Global Governance," in *International Organizations: The Politics and Processes of Global Governance*, 25-35; ibid.
[180] Ibid., 29.
[181] Ibid., 30.

NSG are linked to each other under the international nuclear nonproliferation regime. This is why the regime and international regimes, in general, are "key types of global governance".[182]

2.1.1. Treaty on the Non-Proliferation of Nuclear Weapons (Nuclear Non-Proliferation Treaty, NPT)

Being the cornerstone of the regime, the NPT is based on three pillars of nuclear nonproliferation, peaceful use of nuclear energy and nuclear disarmament all of which mutually reinforce each other.[183] Opened for signature on 1 July 1968, the NPT entered into force on 5 March 1970 after forty-three states ratified and deposited their ratification in accordance with the Article IX/3. As of February 2017, there are 191 states parties to the treaty.[184]

According to the treaty, state parties are either a NWS that have exploded a nuclear device prior to 1 January 1967 or a NNWS.[185] Thus, China, France, Russia, the United Kingdom and the United States are the only NWSs recognized by the treaty.[186] According to Article I, the treaty obliges these five nuclear weapon states not to transfer nuclear weapons while Article II obliges NNWS not to receive or manufacture nuclear weapons which constitutes the pillar of non-proliferation. The second pillar of peaceful use of nuclear energy takes its sources from Article IV on the condition of providing necessary safeguards of the IAEA which is stated in Article III. And Article VI covers the pillar of nuclear disarmament which is to be pursued in good faith.[187]

After the treaty entered into force, review conferences(RevCons) have been held in every five years in order to "review the operation of this Treaty with a view to assuring that the purposes of the Preamble and the provisions of the Treaty are being realized" in accordance with the Article VIII/3. Also, as stated in the Article X/2 that a conference

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[182] Ibid., 32.
[183] Udum, "The Role of Turkey in the 2015 NPT Review Conference," 4.
[184] "Status of the Treaty, Treaty on the Non-Proliferation of Nuclear Weapons."
[185] Article IX/3 *Treaty on the Non-Proliferation of Nuclear Weapons (NPT)*.
[186] Even though India, Israel, North Korea and Pakistan are known or believed to have nuclear weapons, they are not nuclear weapon states as they are not parties to the treaty.
[187] *Treaty on the Non-Proliferation of Nuclear Weapons (NPT)*.

would be convened to decide the treaty's extension for a fixed period of time or indefinitely, 1995 Review and Extension Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons was convened. As a result of this conference, member states decided to indefinite extension of the treaty with Decision 3.[188] This indefinite extension which is milestone for the regime both meant states' benefitting from it and reiterated their commitment to nonproliferation objectives.[189] Another important aspect of the 1995 conference is that states also highlighted the importance of strengthened review process for the treaty. Because of this importance, it was decided to have the Preparatory Committee (PrepCom) meetings in each of the three years prior to the RevCons in Decision 1.[190]

In this review conference, states also defined important principles and objectives in Decision 2 concerning other instruments of the regime. One of these principles and objectives was regarding the completion of negotiations on a universal Comprehensive Nuclear-Test Ban Treaty by the CD. Another one was about completion of negotiations concerning the ban of production of fissile materials for nuclear weapons and other nuclear explosive devices which is currently being negotiated as the FMCT. It was also encouraged to develop NWFZs as well as all kinds of WMD free zones.[191]

Following the 1995 conference, states agreed on a final document in the 2000 RevCon which included thirteen practical steps for implementation of nuclear disarmament according to Article VI of the treaty. These steps consisted of call for both urgently signing and ratifying the CTBT and beginning of negotiations on the FMCT as well as

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[188] "Extension of the Treaty on the Non-Proliferation of Nuclear Weapons, Decision 3," United Nations Office for Disarmament Affairs, accessed February 20, 2017. https://unoda-web.s3-accelerate.amazonaws.com/wp-content/uploads/assets/WMD/Nuclear/1995-NPT/pdf/NPT_CONF199503.pdf.
[189] Udum, "The Role of Turkey in the 2015 NPT Review Conference," 5.
[190] "Strengthening the Review Process For the Treaty, Decision 1," United Nations Office for Disarmament Affairs, accessed February 20, 2017. https://unoda-web.s3-accelerate.amazonaws.com/wp-content/uploads/assets/WMD/Nuclear/1995-NPT/pdf/NPT_CONF199532.pdf.
[191] "Principles and Objectives For Nuclear Non-Proliferation and Disarmament, Decision 2," United Nations Office for Disarmament Affairs, accessed February 20, 2017. https://unoda-web.s3-accelerate.amazonaws.com/wp-content/uploads/assets/WMD/Nuclear/1995-NPT/pdf/NPT_CONF199501.pdf.

establishment of a subsidiary body dealing only with nuclear disarmament in the CD.[192] Unlike 2000 RevCon, states were unable to adopt a final document in the 2005 RevCon. Because by the time the 2005 RevCon started, some weaknesses of the treaty had already been exposed such as North Korea's admitting its nuclear programme in 2002 and its decision for withdrawal from the NPT, and discovery of Iran's undeclared nuclear sites.[193] The Bush administration was also partly responsible for the failure of the 2005 RevCon as former U.S. commitments given in previous RevCons were rejected which, in return, caused an adversarial political environment.[194]

Unlike the 2005 RevCon, the 2010 RevCon was seen as a successful one which was concluded with an adaption of final document which reflected the agreements on nuclear disarmament, nonproliferation safeguards, nuclear energy.[195] This final document also included a commitment concerning the Middle East which was to hold a regional conference in 2012 to discuss implementation of the 1995 Middle East Resolution concerning the establishment a NWFZ. This specific outcome was seen by many as the most important achievement of the 2010 RevCon.[196] Even though there is a misleading popular belief regarding RevCons being cyclical, meaning moving from success to failure in every five years, it proved to be right for the 2015 RevCon. Because, not being able to produce a consensus final document, the 2015 RevCon was seen as failure within the general understanding of RevCons' success depending on the producing a final document.[197]

And typically, at RevCons NNWSs have tried to focus on disarmament while NWSs have encouraged the need for nonproliferation which was no exception in this RevCon.[198] In

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[192] "Review of the Operation of the Treaty, Taking into Account the Decisions and the Resolution Adopted by the 1995 Review and Extension Conference," in *2000 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons Final Document* (New York: 2000), 14.
[193] Jean Pascal Zanders, "Introduction," in *Nuclear Weapons After the 2010 NPT Review Conference*, ed. Jean Pascal Zanders, Chaillot Papers (Paris: EU Institute for Security Studies, April 2010), 5-6.
[194] Rebecca Johnson, "Assessing the 2010 NPT Review Conference," *Bulletin of the Atomic Scientists* 66, no. 4 (2010): 1-2.
[195] Ibid., 1.
[196] Jan Ruzicka, "Reflections on the 2010 NPT Review Conference," *Medicine, Conflict and Survival* 26, no. 4 (2010): 261.
[197] Four out of nine RevCons failed to reach a consensus on final documents. These are 1980, 1990, 2005, and 2015 RevCons.
[198] William C. Potter, "The Unfulfilled Promise of the 2015 NPT Review Conference," *Survival* 58, no. 1 (2016): 151-53.

fact, it was exactly this approach of NNWSs that led NWSs to reject draft final document. The U.S., supported by Canada and the U.K., turned down the draft final document which included the disarmament issue of humanitarian impact of nuclear weapons (HINW) and efforts to agree on effective instrument for implementation of Article VI in the draft final document. It is also believed that the Middle East Resolution of which conference was not held in 2012 also played a role in dismissal of the document.[199] According to the draft final document by the Russians, there would be a deadline of March 2016 for convening a conference in the region. The U.S. rejected this by seeing it as "arbitrary deadline" whereas Canada proposed including Israel in negotiations in spite of Israel's not being a member.[200] Therefore, even though the Middle East Resolution was adopted in 1995 Review and Extension Conference, there has not been a regional conference to discuss establishment of a NWFZ in the Middle East, yet.

Even though the failure of 2015 RevCon to reach a consensus on final document, the majority of member states of the NPT share a common commitment to nonproliferation. Also having 191 member states, the NPT definitely achieved its success as only four states are believed to possess nuclear weapons in addition to NWSs.[201] The number of states having nuclear weapons might have been much higher, even higher than what then-U.S. President Kennedy had predicted if the provisions of NPT were not implemented.

From international regime perspective, as an international treaty, the NPT plays a key role in the structure of the international nuclear nonproliferation regime by creating international laws and rules for states to abide by. In addition, RevCons exemplifies the evolutionary side of this regime in order to be more effective. As already mentioned in the last part of previous chapter, international regimes are open for evolution as a result of new technology, new information, new or changed understanding and capability. Therefore, RevCons are key elements of the treaty to review, discuss and change the

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[199] Tariq Rauf, "The 2015 NPT Review Conference: Setting the Record Straight," Stockholm International Peace Research Institute (SIPRI), last modified June 24, 2015, accessed February 20, 2017. https://www.sipri.org/node/384.

[200] Wilfred Wan, "Why the 2015 NPT Review Conference Fell Apart," United Nations University, Centre for Policy Research, last modified May 28, 2015, accessed February 20, 2017. https://cpr.unu.edu/why-the-2015-npt-review-conference-fell-apart.html.

[201] George Bunn, "World's Nuclear Non-Proliferation Regime in Time," *the IAEA Bulletin* 46, no. 2 (March 2005): 7.

dysfunctional acts which might affect performance of the international nuclear nonproliferation regime.

2.1.2. International Atomic Energy Agency (IAEA)

The International Atomic Energy Agency, known as "Atoms for Peace" organization within the UN, is the international cooperation center for the promotion of safe, secure and peaceful use of nuclear energy.[202] After U.S President Eisenhower's proposal in his address "Atoms for Peace" to the UN General Assembly in 1953, the IAEA was established in 1957 as a result of expectations and fears of discovery and various use of nuclear technology.[203] The objectives and functions of the IAEA are defined in the IAEA Statute. According to the statute, Article II defines its objectives as "to accelerate and enlarge the contribution of atomic energy to peace, health and prosperity throughout the world" and "to ensure that assistance provided by it … is not used in such a way as to further any military purpose".[204]

On the other hand, Article III defines the function of the IAEA. According to this article, the IAEA is authorized: a) to encourage and assist research, development and practical application of nuclear energy for peaceful uses, b) to make provisions for materials, equipment, facilities and services for peaceful uses, c) to promote exchange of know-how information of nuclear energy for peaceful uses, d) to foster training and exchange of experts for peaceful uses e) to create, govern and apply safeguards in order to ensure peaceful use of assistance of any kind, f) to provide standards of safety for protection of health and minimization of danger to life and property, and g) to acquire or create any equipment, plant or facilities to perform its functions if necessary.[205]

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[202] "About Us," International Atomic Energy Agency, accessed February 21, 2017. https://www.iaea.org/about.
[203] "History," International Atomic Energy Agency, accessed February 21, 2017. https://www.iaea.org/about/overview/history.
[204] Article II "Statute of the International Atomic Energy Agency," in *History of the International Atomic Energy Agency: The First Forty Years*, ed. David Fischer (Vienna: International Atomic Energy Agency, 1997), 471.
[205] Article III ibid., 471-73.

In addition to promote peaceful use of nuclear energy, the IAEA is also authorized by the NPT for verification of NNWSs' commitments to the nonproliferation. According to the NPT Article III, each NNWS accepts the IAEA safeguards with the aim of preventing any possible diversion of nuclear energy from peaceful uses. Also, according to the same article, NNWSs are required to conclude agreements with the IAEA individually or together with other states with due regard to the IAEA Statute.[206]

These safeguards are defined in Article XII as "Agency safeguards" in the IAEA Statute. To state the core of safeguards, these consist of: a) examining the design of equipment and facilities and ensuring the peaceful uses of them in accordance with health and safety standards, b) requesting the monitoring of these standards, c) requesting production and maintenance records for assuring the accountability of source materials used, d) demanding and taking progress reports, e) approving that the means to be used for materials assure full compliance with health and safety standards and no diversion of materials for military purposes, f) requesting recovered or produced as by-product materials or any excess of materials deposit with the IAEA for preventing the stockpiling, g) sending inspectors who shall have access at any time to any place, data, person, equipment, facilities in order to determine compliance. In case of non-compliance and inability of concerning state or states to take corrective actions within given time, the IAEA has right "to suspend or terminate assistance and withdraw any materials and equipment made available by the Agency or a member in furtherance of the project".[207] Accordingly, all NNWSs negotiate and conclude Comprehensive Safeguards Agreements (CSAs) with the IAEA in conformity with the statute and on the basis of document called "INFCIRC/153 (Corrected)" which is a framework of such agreements.[208]

In addition to these, the IAEA is also taking part in the verification of NWFZs and ex-nuclear weapon material in practical terms.[209] Because each state party to a NWFZ is

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[206] Article III/1 and III/4 *Treaty on the Non-Proliferation of Nuclear Weapons (NPT)*.
[207] Article XII "Statute of the International Atomic Energy Agency," in *History of the International Atomic Energy Agency: The First Forty Years*.
[208] The document INFCIRC/153 (Corrected) is titled as "The Structure and Content of Agreements Between the Agency and States Required in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons"
[209] "Key Roles," International Atamic Energy Agency, accessed February 21, 2017. https://www.iaea.org/newscenter/focus/npt/key-roles.

obliged to conclude CSAs governed by the IAEA. The Treaty of Semipalatinsk which is the Central Asian NWFZ treaty requires states in the region to conclude an Additional Protocol (AP)with the IAEA. Also, as a part of the Pelindaba Treaty, which is the African NWFZ Treaty, gives authorization to the IAEA to verify both the dismantlement and destruction of nuclear explosives and conversion or destruction of their production facilities.[210]

As the IAEA states, the aim of these safeguards is "to deter the spread of nuclear weapons by the early detection of the misuse of nuclear material or technology".[211] Also, as the UN expressed in 2015 RevCon IAEA fact sheet, the IAEA has limited tools to implement safeguards under CSAs. Thus, detecting undeclared nuclear material and activities pose great challenges to the IAEA.[212] This was seen in the IAEA experience with Iraq that violated the safeguards with a massive nuclear weapons program. After the 1991 Persian Gulf War, the IAEA inspectors stated that Iraq failed to declare its large network of nuclear facilities to the IAEA. There were undeclared facilities and installations all around the country including undeclared installations at the Tuwaitha Nuclear Research Center which were close enough to an IAEA inspected research reactor. According to Theodore Hirsch, what makes the IAEA so "powerless to detect such clandestine activities" is INFCIRC/153 (Corrected) according to which safeguards were designed to verify (declared) material is not diverted for any other use than peaceful use.[213] In addition to the Iraq case, the IAEA experience with North Korea showed the weaknesses of the safeguards systems. After having signed the safeguard agreement in 1992, North Korea submitted its initial reports to IAEA which had inconsistencies with inspectors' findings. This was a starting point of incidents which included North Korea's rejection of special inspection by the IAEA, the UN Security Council call for compliance and North Korea's withdrawal of membership from IAEA in 1994. Even though the IAEA concluded the

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[210] "Treaty Verification: Understanding IAEA Safeguards," Nuclear Threat Initiative, accessed February 21, 2017. http://tutorials.nti.org/nonproliferation-regime-tutorial/treaty-verification-understanding-iaea-safeguards/#_ednref2.
[211] "Basics of IAEA Safeguards," International Atomic Energy Agency, accessed February 21, 2017. https://www.iaea.org/topics/basics-of-iaea-safeguards.
[212] "The IAEA Fact Sheet," United Nations, accessed February 21, 2017. www.un.org/en/conf/npt/2015/pdf/IAEA%20factsheet.pdf.
[213] Theodore Hirsch, "The IAEA Additional Protocol: What It is and Why It Matters," *The Nonproliferation Review* 11, no. 3 (2004): 142.

noncompliance of North Korea with the safeguards agreement, complete picture of North Korea's nuclear activities was not covered.[214]

These experiences showed that even though safeguard system worked well on declared facilities and activities, there was a need for strengthening safeguard system to detect undeclared activities. As a result, the IAEA started a comprehensive programme called "Programme 93+2" to improve safeguards system in 1993 which led to the Model Additional Protocol (AP) in 1997.[215] With the AP, the IAEA is equipped with complementary rights for access to information and sites which provides better assurance on the absence of undeclared activities. In spite of being a voluntary protocol, once the AP enters into force, its provisions become legally binding. These include mainly: a) state provision of information about and the IAEA access to all nuclear fuel cycle of a state as well as fuel cycle research and development activities not involving nuclear material, b) state provision of information about and short notice access to all buildings, c) state provision of information about and access to manufacturing and import locations concerning sensitive material and equipment, d) environmental samples of both declared and undeclared locations, e) simplified procedures for inspectors.[216] In short, the AP provides improved capabilities for the IAEA to ensure peaceful use of nuclear energy as well as early detection of any misuse of nuclear energy with comprehensive access.

Despite its improved measures and better assurance of nonproliferation, only 126 states signed and ratified an AP with the IAEA as of March 2016 while other 19 states signed but have not ratified yet.[217] According to Hirsch, the AP "transforms IAEA inspectors from accountant to detectives" while being a strong deterrence for noncompliance with

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[214] For more details, see "Fact Sheet on DPRK Nuclear Safeguards," International Atomic Energy Agency, last modified Novermber 12, 2014, accessed February 21, 2017. https://www.iaea.org/newscenter/mediaadvisories/fact-sheet-dprk-nuclear-safeguards.
[215] "Additional Protocol," International Atomic Energy Agency, accessed February 21, 2017. https://www.iaea.org/safeguards/safeguards-legal-framework/additional-protocol.
[216] *Model Protocol Additional to the Agreement(s) Between State(s) and the International Atomic Energy Agency for the Application of Safeguards*, *INFCIRC/540* (Vienna: International Atomic Energy Agency, September 1997).
[217] "Additional Protocol."

the NPT.[218] And now, the NPT's verification standard consist of the strengthened safeguards systems having both the CSA and the AP.[219]

The international nuclear nonproliferation regime benefits from the IAEA which is an IGO as a part of global governance. In addition to verifying the compliance of member states, the IAEA helps states shape international discussions on nuclear issues through its policy-making bodies such as "Board of Governors" and annual "General Conference". This, in return, leads this regime to provide trust, continuity and stability with the improved capabilities thanks to the AP which ensures that no clandestine nuclear material, activity or facility exists. In addition, the AP has brought new obligations to increase effectiveness of this regime and minimize the deficiencies that might impair trust, continuity and stability.

2.1.3. Conference on Disarmament (CD)

The Conference on Disarmament was created in 1979 as a result of the first Special Session on Disarmament of the UN General Assembly. The CD is a multilateral disarmament mechanism which succeeded three former Geneva based disarmament negotiation fora. Namely, these were the Ten-Nation Committee on Disarmament (1960), the Eighteen-Nation Committee on Disarmament (1962-68), and the Conference of the Committee on Disarmament (1969-78).[220] Having sixty-five member states as of February 2017,[221] the CD practically covers all multilateral arms control and disarmament problems. As a part of the regime, nuclear disarmament and effective international arrangements concerning negative security assurances are among the CD's primary objectives.[222]

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[218] Hirsch, "The IAEA Additional Protocol: What It is and Why It Matters," 143.
[219] Masahiko Asada, "Strengthening the Nuclear Non-Proliferation Regime: Proposals and Problems," *The International Spectator* 44, no. 1 (2009): 71-72.
[220] The NPT was negotiated by the Eighteen-Nation Committee on Disarmament.
[221] Forty other states joined 2016 session as observer.
[222] Ben Baseley-Walker, "Outer Space, Geneva and the Conference on Disarmament: Future Directions," *Space Policy* 28, no. 1 (2012): 46; "An Introduction to the Conference," United Nations Office For Disarmament Affairs, accessed February 22, 2017. https://www.un.org/disarmament/geneva/cd/an-introduction-to-the-conference/.

As a part of the UN, the CD has its own procedures and agenda which are adopted in accordance with the recommendations of the UN General Assembly. However, the CD has not been able to produce any more solutions after completing the negotiations of the CTBT in mid-1996 as not being able to come to an agreement on programme of work except for 1998 and 2009. As a result of the problems stemming from difficulties both in relations of key players and in determination of agenda priorities, the CD has not come to a conclusion on some important items such as the FMCT, nuclear disarmament, the prevention of an arms race in outer space and negative security assurances.[223]

Evaluating the inability of the CD for these issues, Ben Baseley-Walker states that most of the process-related problems stems from institutional formulation of the CD which was based on above stated former mechanisms. According to him, these former disarmament fora were "split along ideological lines" as the Eastern bloc, the Western bloc and the non-aligned states. However, during 1970s, the division was restructured to have two sides, the superpowers and their allies on one side and the increasingly influential non-aligned movement (NAM) on the other side. As a result, the final document establishing the CD "effectively reflected the non-aligned movement's position".[224] Having this political background along with current security dynamics, member states of the CD do not allow progress. For example, Pakistan opposes the FMCT. Because, it is concerned with the possibility of India's advancing nuclear weapon program as result of 2009 U.S.-India nuclear deal which provided India access to assistance for civilian nuclear program and enabled it to purchase nuclear technology of dual-use.[225] Similarly, Jozef Goldblat states that what prevents the CD from taking possible measures are its outdated membership structure reflecting military and geopolitical realities of 1970s, its agenda, not being able to negotiate simultaneously more than one measure and procedure-related inflexibilities.[226]

From a constructive point, the Tokyo Forum for Nuclear Non-Proliferation and Disarmament offered a solution for the problems which requires "to revise its procedures,

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[223] "Conference on Disarmament (CD)."
[224] Baseley-Walker, "Outer Space, Geneva and the Conference on Disarmament: Future Directions," 46.
[225] Ibid., 47.
[226] Jozef Goldblat, "The Conference on Disarmament at the Crossroads: to Revitalize or Dissolve?," *The Nonproliferation Review* 7, no. 2 (2000): 104.

update its work program and carry out purposeful work or suspend its operations".[227] From the same vein, Jorge Morales Pedraza mainly suggests that re-organizing political groups within its members and adopting voting system instead of consensus as well as creating an enforcing mechanism for agreements might better equip the CD.[228]

Nonetheless, the NPT and the CTBT as well Environmental Modification and Seabed treaties, the Biological and Toxic Weapons Convention (BTWC) and the Chemical Weapons Convention are among important agreements that have been negotiated and concluded by the CD and its former forms. In spite of obstacles experienced today, these agreements reflect the potential of the CD which can be truly achieved with the political will.

2.1.4. Comprehensive Nuclear-Test Ban Treaty (CTBT)

Opened for signature in September 1996, the Comprehensive Nuclear-Test Ban Treaty, as the name suggests, prohibits all nuclear explosions by which increases the difficulty of both making nuclear bombs for the first time and making more powerful bombs. This prohibition applies to all surface, atmosphere, underwater and underground nuclear explosions to be tested by everyone which also restricts damages of radioactivity release.[229] Also, the CTBT reflects the broader commitment of NWSs to cease more nuclear weapon development and work towards nuclear disarmament which was an important promise to NNWSs in exchange for their support for NPT's indefinite extension.[230]

The CTBT establishes an organization called CTBTO in order to achieve its objectives, to assure the implementation of provisions and to provide a forum for cooperation among member states (Article II). The CTBT with its Protocol I, II and III offers a complete

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[227] "Facing Nuclear Dangers: An Action Plan for the 21st Century - Key Recomendations," Tokyo Forum for Nuclear Non-Proliferation and Disarmament, last modified July 25, 1999, accessed February 22, 2017. http://www.mofa.go.jp/policy/un/disarmament/forum/tokyo9907/key.html.
[228] Jorge Morales Pedraza, "The Reform of the United Nations Disarmament Machinery," *Public Organization Review* 16, no. 3 (2016): 328-32.
[229] "Who We are," Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization, accessed February 22, 2017. https://www.ctbto.org/specials/who-we-are/.
[230] Robert Nelson, "3 Reasons Why the U.S. Senate Should Ratify the Test Ban Treaty," *Bulletin of the Atomic Scientists* 65, no. 2 (2009): 52-53.

verification system which consists of the International Monitoring System using seismic, hydroacoustic, infrasound and radionuclide monitoring techniques, on-site inspections and confidence building measures.[231]

Although it was opened for signature in 1996, the CTBT still waits to enter into force. Because, Article XIV of the CTBT requires signature and ratification of all states mentioned Annex 2 to the treaty. These states consist of the CD member states that had nuclear power or research reactor as of 1996.[232] Thirty-six out of forty-four states both signed and ratified the CTBT while India, North Korea and Pakistan have not signed and ratified, yet. Also, China, Egypt, Iran, Israel, and the U.S. have not ratified the CTBT in spite of signing in 1996.[233]

Even though the UN Security Council Resolution 2310 (2016) urges these states to sign and ratify or ratify the treaty immediately,[234] they have not acted in accordance with the Resolution.

2.1.5. Fissile Material Cut-off Treaty (FMCT)

It has been nearly thirteen years since former U.S. President Bill Clinton made his speech about new steps towards an international agreement which would prohibit the production of fissile materials.[235] Following the speech, the UN General Assembly adopted Resolution 48/75L in the end of 1993 recommending the negotiation of a treaty which prohibits the production of fissile materials, which is referred as the FMCT.[236] Then, the

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[231] *The Comprehensive Nuclear-Test-Ban Treaty (CTBT)*, (24 September 1996), https://www.ctbto.org/fileadmin/content/treaty/treaty_text.pdf.
[232] Ibid.
[233] "The Comprehensive Nuclear Test Ban Treaty (CTBT)," Nuclear Threat Initiative, last modified November 28, 2016, accessed February 22, 2017. http://www.nti.org/learn/treaties-and-regimes/comprehensive-nuclear-test-ban-treaty-ctbt/.
[234] "Adopting Resolution 2310 (2016), Security Council Calls for Early Entry into Force of Nuclear-Test-Ban Treaty, Ratification by Eight Annex 2 Hold-Out States," United Nations, last modified September 23, 2016, accessed February 22, 2017. http://www.un.org/press/en/2016/sc12530.doc.htm.
[235] "Bill Clinton's Remarks to the 48th Session of the United Nations General Assembly in New York City," American Presidency Project, last modified September 27, 1993, accessed February 23, 2017. http://www.presidency.ucsb.edu/ws/index.php?pid=47119.
[236] "Resolution 48/75L - Prohibition of the Production of Fissile Material for Nuclear Weapons or Other Nuclear Explosive Devices," United Nations, last modified December 16, 1993, accessed February 23, 2017. http://www.un.org/documents/ga/res/48/a48r075.htm.

CD started discussion on the basis of such treaty in 1994. However, since that time, the CD has not been able to reach consensus on a treaty even though it was able to establish an *ad hoc* committee to negotiate a treaty in 1998. In addition to above stated problems within the CD, there are problems specifically stemming from content of the treaty such as treaty's covering existing stockpiles and time sensitive schedules.[237] For example, according to Annette Schaper, the fundamental problem lies on where the emphasis of proposal should be placed. Because, some member states of the CD offers non-proliferation as the main emphasis while others presents disarmament as the priority.[238]

As there is not a negotiated treaty text, it is not possible to discuss its scope. But the main purpose is to establish a legal instrument to address a key item which is not given a direct attention in the NPT.[239] And, its possible conclusion will offer important benefits and boast the two pillars of non-proliferation and disarmament by both limiting the available materials and improving the environment of the trust among states.[240] In addition, it would address also four *de facto* nuclear weapon states who are not members to the NPT and thus, it would strengthen the regime. Similarly, Steven Miller and Scott Sagan states that if states manage to make the CTBT and the FMCT enter into force, there would be less incentives to acquire nuclear weapons. Thus, it might lead to "more extensive and effective nuclear nonproliferation regime".[241]

2.1.6. Zangger Committee (ZAC)

The lack of definition concerning materials in the NPT Article III/2, "(a) source or special fissionable material, or (b) equipment or material especially designed or prepared for the processing, use or production of special fissionable material",[242] caused different

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[237] For more information, see *A Fissile Material Cut-off Treaty: Understanding the Critical Issues* (Geneva: United Nations Institute for Disarmament Research, 2010), 1-9, http://www.unidir.org/files/publications/pdfs/a-fissile-material-cut-off-treaty-understanding-the-critical-issues-139.pdf.
[238] Annette Schaper, "Justice and Injustice in the Fissile Material (Cutoff) Treaty," *International Negotiation* 19, no. 3 (2014): 570.
[239] "Iran, the Fissile Materials Cutoff Treaty (FMCT), and Beyond," in *The Worst-Kept Secret: Israel's Bargain with the Bomb*, ed. Avner Cohen (Columbia University Press, 2010), 230.
[240] *A Fissile Material Cut-off Treaty: Understanding the Critical Issues*, 27.
[241] Steven E. Miller and Scott D. Sagan, "Alternative Nuclear Futures," *Daedalus* 139, no. 1 (2010): 134.
[242] *Treaty on the Non-Proliferation of Nuclear Weapons (NPT)*.

interpretations. To clarify, some members of the NPT created the Zangger Committee[243] in 1971 which provided two different memoranda in 1974.[244]

These memoranda are known as the Trigger List which includes definition of source or special fissionable materials and the list of equipment and materials for processing, use or production. This list also brought guidelines that governs the export of these materials to NNWSs not part to the NPT. According to the guidelines of the list, a supplier state requires both non-explosive use assurance and IAEA safeguards condition in addition to re-application of these two when re-exporting. The IAEA have administered the list as IAEA document "INFCIRC/209" since 1974 and the ZAC has reviewed and updated it since then.[245]

Even though the Nuclear Suppliers Group was established in 1974 and shared many of the ZAC's objectives, the NSG did not go further than agreeing on guidelines which includes the Trigger List.[246] With the re-emergence of the NSG with second of guidelines concerning dual-use materials in 1992, which is detailed below, the existence of the ZAC was started to be questioned. Some argued to merge the ZAC, which had a scope with limited to the NPT, with the NSG. On the other hand, others supported the ZAC having its roots within NPT Article III/2 and there would be further works. Consequently, the ZAC continues to "provide a forum for interpreting supplier commitments" in accordance with NPT Article III/2.[247]

2.1.7. Nuclear Suppliers Group (NSG)

The Nuclear Supplier Group, formerly known as the London Group, was established in 1974 in response to Indian nuclear test which showed possible diversion of peaceful

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[243] The Committee was named after its first chairman, Professor Claude Zangger.
[244] Tadeusz Strulak, "The Nuclear Suppliers Group," *The Nonproliferation Review* 1, no. 1 (1993): 2.
[245] "Zangger Committee (ZAC)," Nuclear Threat Initiative, last modified September 20, 2016, accessed February 23, 2017. http://www.nti.org/learn/treaties-and-regimes/zangger-committee-zac/.
[246] Fritz Schmidt, "NPT Export Controls and the Zangger Committee," *The Nonproliferation Review* 7, no. 3 (2000): 138.
[247] Fritz W. Schmidt, "Zangger Committee: Its History and Future Role," *The Nonproliferation Review* 2, no. 1 (1994): 38-42.

nuclear technology to proliferation. [248] The Indian nuclear test also showed the need for a stricter focus on nuclear exports. Because, the ZAC, as a similar mechanism, was negotiating what the minimum requirements should be applied. Thus, a new suppliers group was created including France, a major supplier, that was not a then-member of neither the NPT nor, as a result, the ZAC.[249]

Having forty-eight member states as of January 2017,[250] the NSG is multinational body that implements two sets of guidelines for both nuclear and nuclear-related exports in an aim of making contribution to non-proliferation.[251] These guidelines include the incorporation of the ZAC Triger List with additional heavy water production items.[252] And, the scope of the guidelines is to assure that nuclear trade does not contribute to proliferation and to support nuclear trade consistent with the regime. The first set of guidelines applies to nuclear transfers and re-transfers to any state and offers physical protection, safeguard and various control guidelines while the second set manages nuclear-related dual use transfers which might contribute to proliferation or to nuclear terrorism.[253]

It should be also noted that the second set of guidelines were adopted in 1992 after Iraq experience of the NSG members. Because Iraq was able to develop a formidable nuclear weapon program with the vast amount of equipment, materials and technology exported from most of the NSG members. Iraq managed to export these by exploiting supplier's national regulations on dual-use items, hiding its true end-use, method of transshipment through third countries and clandestine acquisition.[254]

As a part of guidelines, there is a principle called "Non-Proliferation Principle" according to which a supplier state authorizes a transfer only when it is assured of transfer's not

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[248] Saira Bano, "India and Nuclear Suppliers Group (NSG) membership," *Global Change, Peace & Security* 27, no. 2 (2015): 123.
[249] Strulak, "The Nuclear Suppliers Group," 3.
[250] "the Nuclear Suppliers Group (NSG)," Nuclear Threat Initiative, last modified January 31, 2017, accessed February 23, 2017. http://www.nti.org/learn/treaties-and-regimes/nuclear-suppliers-group-nsg/.
[251] "About the NSG."
[252] When compared to the Zangger Committee memoranda, the NSG guidelines offer more strict conditions for nuclear exports. Strulak, "The Nuclear Suppliers Group," 3.
[253] "Guidelines," Nuclear Suppliers Group, accessed February 23, 2017. http://www.nuclearsuppliersgroup.org/en/guidelines.
[254] Strulak, "The Nuclear Suppliers Group," 4-5.

being used for nuclear proliferation. Also, these guidelines are fully consistent with and complementary to the NPT and various NWFZs.[255]

There is an important fact that the NSG exempted India from requirement of IAEA Full-Scope Safeguards, thus allowing India, without giving up nuclear weapon program, to make nuclear trade with the NSG members.[256]

2.1.8. Nuclear-Weapon-Free Zones

According to the UN, a nuclear-weapon-free zone is any zone recognized by the UN General Assembly which "any group of States, in the free exercise of their sovereignty, has established by virtue of a treaty or convention".[257] On the other hand, the NPT Article VII reminds member states of their rights to have regional treaties which "assure the total absence of nuclear weapons in their respective territories".[258] Thus, establishment of such zones reflects regional commitments made to support the international nuclear nonproliferation regime.

There are five nuclear-weapon-free zones recognized by the UN Generally Assembly which are discussed below. In addition to these zones, there is a single-state NWFZ declared by Mongolia. There are also similar treaties and agreements such as Antarctic Treaty, Outer Space Treaty, Seabed Treaty and Moon Agreement which govern the denuclearization of concerning areas.[259]

Following the Cuban Missile Crisis, some Latin American states started to negotiate a treaty of denuclearization in the region which was opened for signature in 1967 as being the first of its kind to cover a populated region.[260] According to this treaty which is called as the Treaty of Tlatelolco, both testing, production, use or acquisition and receipt,

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[255] "About the NSG."
[256] Bano, "India and Nuclear Suppliers Group (NSG) membership," 123.
[257] United Nations General Assembly Resolution 3472-B, *Comprehensive Study of the Question Of Nuclear-Weapon-Free Zones in All Its Aspects*, A/RES/3472 (December 11, 1975), http://www.un.org/en/ga/search/view_doc.asp?symbol=A/RES/3472(XXX).
[258] *Treaty on the Non-Proliferation of Nuclear Weapons (NPT)*.
[259] "Nuclear-Weapon-Free Zones," United Nations Office for Disarmament Affairs, accessed February 24, 2017. https://www.un.org/disarmament/wmd/nuclear/nwfz.
[260] *Nuclear-Weapon-Free Zones* (United Nations Institute for Disarmament, 2011), 5, http://www.unidir.org/files/publications/pdfs/nuclear-weapon-free-zones-en-314.pdf.

deployment or installation of nuclear weapons are prohibited.[261] This treaty requires its member states to conclude safeguards agreements with the IAEA either bilaterally or multilaterally.[262] Also, to assure compliance of member states with the provision of the Treaty, Article 7 establishes *Organismo para la Proscripción de las Armas Nucleares en la América Latina y el Caribe* (Agency for the Prohibition of Nuclear Weapons in Latin America and the Caribbean, OPANAL).[263] The treaty has two additional protocols. The Additional Protocol I addresses states that have either *de facto* or *de jure* jurisdiction on territories in the treaty zone of application and requires them to abide by the obligations of the treaty.[264] The Additional Protocol II, on the other hand, addresses NWSs and requires them to respect denuclearization of the region as well as to give negative security assurances.[265]

Having 33 states as of September 2016, zone of application this treaty covers the whole Latin America and Caribbean region as well as large area of the Pacific and Atlantic Oceans.[266] When Brazil and Argentina which have powerful nuclear power industries in the region are taken into consideration, the existence of this treaty prevents a potential environment of nuclear arms race between these two key players of the region by providing a regional norm and confidence-building framework. Combining regional and global safeguards in the region, this treaty offers a regional nonproliferation environment[267] and thus, it strengthens the international nuclear nonproliferation regime.

Similarly, the atmospheric and underwater nuclear tests conducted in closer areas by France, the UK and the U.S. caused serious concerns for states of Asia-Pacific region. These tests as well as nuclear wastes dumped in the region led to NFWZ negotiations at

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[261] Article 1/1, *Treaty for the Prohibition of Nuclear Weapons in Latin America and the Caribbean*, (1967), http://disarmament.un.org/treaties/t/tlatelolco/text.
[262] Article 13, ibid.
[263] Article 7/1, ibid.
[264] *Additional Protocol I to the Treaty for the Prohibition of Nuclear Weapons in Latin America and the Caribbean*, (1967), http://disarmament.un.org/treaties/t/tlateloco_p1/text.
[265] *Additional Protocol II to the Treaty for the Prohibition of Nuclear Weapons in Latin America and the Caribbean*, (1967), http://disarmament.un.org/treaties/t/tlateloco_p2/text.
[266] "Treaty for the Prohibition of Nuclear Weapons in Latin America And the Caribbean (LANWFZ) (Tlatelolco Treaty)," Nuclear Threat Initiative, last modified September 22, 2016, accessed February 24, 2017. http://www.nti.org/learn/treaties-and-regimes/treaty-prohibition-nuclear-weapons-latin-america-and-caribbean-lanwfz-tlatelolco-treaty/.
[267] *Nuclear-Weapon-Free Zones*, 9.

the South Pacific Forum. Consequently, inspired by the Treaty of Tlatelolco, Antarctic Treaty and the NPT, the Treaty of Rarotonga established South Pacific Nuclear Free Zone (SPNFZ) in 1985.[268]

In addition to the obligations stated in the Treaty of Tlatelolco, this treaty expands its scope including atmospheric and underground testing of any nuclear devices (Article 6) and prevention of nuclear wastes dumping (Article 7). Unlike the Treaty of Tlatelolco, compliance is verified through reports, information exchange, consultation and the IAEA safeguards (Article 8, 9, 10).[269] Similar to treaty of Tlatelolco protocols, there are three protocols of this treaty. The Protocol 1 addresses to states that have territories within the SPNFZ and requires them to apply prohibitions of the treaty.[270] The Protocol 2 addresses NWSs and calls for negative security assurances for both parties to the treaty and territories of SPNFZ[271] while Protocol 3 addresses NWSs not to test nuclear devices within any territory of the zone.[272]

Having thirteen members as of July 2016, the treaty of Rarotonga is seen as a development upon the Tlatelolco Treaty by including prevention of nuclear waste dump and nuclear explosive testing.[273]

From the same vein, as a response to NWSs military bases as well as nuclear weapon transits in the region, some member of the Association of Southeast Asian Nations (ASEAN) signed declaration of Zone of Peace, Freedom and Neutrality in South-East Asia (ZOPFAN) initiative 1971. Even though the ZOPFAN pursued an agenda of establishment of a NWFZ, it could not manage to do so due to the unfavorable political atmosphere. Following the closure of military bases in the region in 1995 in addition to a

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[268] "South Pacific Nuclear-Free Zone (SPNFZ) Treaty of Rarotonga," Nuclear Threat Initiative, last modified July 12, 2016, accessed February 24, 2017. http://www.nti.org/learn/treaties-and-regimes/south-pacific-nuclear-free-zone-spnfz-treaty-rarotonga/.
[269] *South Pacific Nuclear Free Zone Treaty*, (1985), http://disarmament.un.org/treaties/t/rarotonga/text.
[270] *Protocol 1 to the South Pacific Nuclear Free Zone Treaty*, (1986), http://disarmament.un.org/treaties/t/rarotonga_p1/text.
[271] *Protocol 2 to the South Pacific Nuclear Free Zone Treaty*, (1986), http://disarmament.un.org/treaties/t/rarotonga_p2/text.
[272] *Protocol 3 to the South Pacific Nuclear Free Zone Treaty*, (1986), http://disarmament.un.org/treaties/t/rarotonga_p3/text.
[273] "South Pacific Nuclear-Free Zone (SPNFZ) Treaty of Rarotonga."

decade of negotiations, the Bangkok Treaty was signed establishing the Southeast Asian Nuclear-Weapon-Free Zone (SEANWFZ) with ten member states.[274]

The Bangkok Treaty has key denuclearization provisions of both previous NWFZs. However, unlike previous zones, the treaty includes continental shelves and Exclusive Economic Zones (EEZ) into the SEANWFZ (Article 1/a and Article 2/1). This treaty establishes a "Commission for the Southeast Asia Nuclear Weapon-Free Zone" in order to ensure compliance with the provisions of the treaty (Article 8).[275] Similar to the previous treaties, there is a protocol to the treaty which addresses NWSs and calls for not to contribute any violation of the treaty and negative security assurances to the parties to the treaty. In addition, the Protocol requires them not to "use or threaten to use nuclear weapons within the SEANWFZ".[276]

Even though other protocols to the previous treaties have been signed and ratified by most of the NWSs, the Protocol of the Bangkok Treaty has not been signed by any of the NWSs. Because, they reject the definition of zone which includes the continental shelves of the member states and their EEZ as well as the restriction on both the use of nuclear weapons within the zone and the passage of nuclear powered ships.[277]

As a result of French nuclear tests in the Sahara in 1960s and South African nuclear program, Declaration on the Denuclearization of Africa was issued by the Organization of African Unity in 1964 which is now the African Union. However, it took years to negotiate and prepare a draft as a result of African political atmosphere. Finally, with the help of the UN, African states signed the Treaty of Pelindaba in 1996, thus established the African Nuclear Weapon Free Zone (ANWFZ).[278] The zone has thirty-nine member

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[274] *Nuclear-Weapon-Free Zones*, 7; "Southeast Asian Nuclear-Weapon-Free-Zone (SEANWFZ) Treaty (Bangkok Treaty)," Nuclear Threat Initiative, last modified September 22, 2016, accessed February 24, 2017. http://www.nti.org/learn/treaties-and-regimes/southeast-asian-nuclear-weapon-free-zone-seanwfz-treaty-bangkok-treaty/.
[275] *Treaty on the Southeast Asia Nuclear Weapon-Free Zone*, (1995), http://disarmament.un.org/treaties/t/bangkok/text.
[276] *Protocol to The Treaty on Southeast Asia Nuclear Weapon-Free Zone*, (1995), http://disarmament.un.org/treaties/t/bangkok_protocol/text.
[277] "Southeast Asian Nuclear-Weapon-Free-Zone (SEANWFZ) Treaty (Bangkok Treaty)."
[278] *Nuclear-Weapon-Free Zones*, 7-8.

states as of September 2016, including the Sahrawi Arab Democratic Republic which is not a UN member state.[279]

The Treaty of Pelindaba has similar provisions of previous zones such as undertaking not to research, develop and manufacture or acquire nuclear explosive devices, not to seek assistance or give assistance or encourage to do so (Article 3), prevention of nuclear weapons deployment (Article 4), prohibition of testing (Article 5), preventing nuclear waste dumbing (Article 7), verification of peaceful uses and the IAEA safeguards (Article 9), establishing the African Commission on Nuclear Energy in to assure compliance (Article 12). However, unlike previous zone treaties, the Treaty of Pelindaba has an article concerning "dismantling, destruction or conversion of nuclear explosive devices and the facilities for their manufacture" which will be verified by the IAEA and the African Commission on Nuclear Energy. (Article 6). Importantly, Article 10 requires member states "to maintain the highest standards of security and effective physical protection of nuclear materials, facilities and equipment to prevent theft or unauthorized use and handling" by applying measures similar to CPPNM and to the guidelines of the IAEA. Also, Article 11 requires member "not to take, or assist, or encourage any action aimed at an armed attack by conventional or other means against nuclear installations" in the application zone of the treaty.[280]

Similar to previous zone treaties, Protocol I addresses NWSs and calls for negative security assurances for parties to states and territories within application zone of the treaty.[281] Protocol II also addresses NWSs and requires them not to contribute to violation of the treaty and not to test nuclear explosive device within application zone of the treaty [282] while Protocol III requires states that have *de facto* or *de jure* jurisdiction on territories within the zone of the treaty to abide by provisions of the treaty.[283]

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[279] "African Nuclear Weapon Free Zone (ANWFZ) Treaty (Treaty of Pelindaba)," Nuclear Threat Initiative, last modified September 19, 2016, accessed February 25, 2017. http://www.nti.org/learn/treaties-and-regimes/african-nuclear-weapon-free-zone-anwfz-treaty-pelindaba-treaty/.
[280] *African Nuclear Weapon Free Zone (ANWFZ) Treaty (Treaty of Pelindaba)*, (1996), http://disarmament.un.org/treaties/t/pelindaba/text.
[281] *Protocol I to the Pelindaba Treaty*, (1996), http://disarmament.un.org/treaties/t/pelindaba_1/text.
[282] *Protocol II to the Pelindaba Treaty*, (1996), http://disarmament.un.org/treaties/t/pelindaba_2/text.
[283] *Protocol III to the Pelindaba Treaty*, (1996), http://disarmament.un.org/treaties/t/pelindaba_3/text.

The treaty plays a key role in preventing both proliferation in the African territory and use of territory for nuclear explosive devices. It also led to reverse proliferation by helping South Africa who gave up its nuclear program in 1989 dismantle, destruct and converse nuclear devices and facilities.[284] In addition, in spite of not mentioning namely, it also attaches importance to nuclear security with Article 10 and 11.

Finally, after gaining independence in 1991, the Central Asian states started negotiations of a NWFZ in the region. In 1997, these states issued the Almaty Declaration in direction for a Central Asia Nuclear-Weapon-Free-Zone (CANWFZ) treaty. Following the long discussions and negotiations on the text of the treaty, the Central Asian states adopted a final draft which was opened for signature in 2006.[285]

Having all the Central Asian states as members, namely Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan, the Treaty of Semipalatinsk presents similar obligations of zone treaties for members to undertake. However, there are important provisions of the treaty that makes it different than previous examples. From this vein, Article 5 of the treaty requires accordance with the CTBT while prohibiting testing of nuclear weapons and nuclear explosive devices. Also, Article 6 requires member states to assist environmental decontamination of territories which were exposed as a result of past activities. Another important point of the treaty is that it requires member states to conclude safeguards agreements in accordance not only with INFCIRC/153 (Corrected) but also with the Additional Protocol (Article 8). Like the Treaty of Pelindaba, this treaty requires member states to maintain physical protection measures for nuclear material, facilities and equipment as effective as measures in the CPPNM and the IAEA guidelines. But, this treaty takes this obligation further by including physical protection to nuclear material and facilities in domestic use, transport and storage which is covered by the Amendment to the CPPNM (Article 9). And like Treaty of Rarotonga, this treaty does not establish a mechanism to ensure compliance of the obligations. Instead, Article 12 urges

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[284] *Nuclear-Weapon-Free Zones*, 10.
[285] "Central Asia Nuclear-Weapon-Free-Zone (CANWFZ)," last modified February 1, 2017, accessed February 25, 2017. http://www.nti.org/learn/treaties-and-regimes/central-asia-nuclear-weapon-free-zone-canwz/.

members states to take necessary measures for effective compliance.[286] As usual, Protocol 1 of the treaty addresses to NWSs and calls for negative security assurances and requires them not to contribute violation of the treaty.[287]

This treaty decreases the proliferation risks within the region by preventing use of the region for testing and deployment.[288] Also, its commitment to the IAEA and the AP, and the CPPNM and Amendment strengthens both the international nuclear nonproliferation regime and nuclear security.

As it can be seen from various components of the regime, it concentrates on state-level prevention of further proliferation of nuclear weapons while promoting peaceful use of nuclear energy and nuclear disarmament. Naturally, this regime does not respond the threat of nuclear terrorism. Because, this regime has been a response to traditional state-level threats such as nuclear war and nuclear nonproliferation which constituted the threat perception of that time. However, as already explained in previous chapter and stated by former President Obama, "the threat of global nuclear war has gone down, but the risk of a nuclear attack has gone up".[289] As a result, this leads states to international responses to the threat of nuclear terrorism which is nuclear security. At this point, all the parts of the international nuclear nonproliferation regime which cope with the traditional state-level threats can inspire and guide nuclear security to prevent threats stemming from asymmetric wars and terrorism. Accordingly, the following part will present these international responses to the threat of nuclear terrorism.

2.2 INTERNATIONAL RESPONSES TO NUCLEAR TERRORISM

As a response to the threat of nuclear terrorism and inability of the international nuclear nonproliferation regime to address the threat, states concluded several agreements and launched various initiatives. These responses have been intensified with the effects of 9/11 attacks and have achieved some success. From this point, existing nuclear security

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[286] *Treaty on a Nuclear-Weapon-Free Zone in Central Asia (CANWFZ)*, (2006), http://disarmament.un.org/treaties/t/canwfz/text.
[287] *Protocol to the Treaty on a Nuclear-Weapon-Free Zone in Central Asia*, (2014), http://disarmament.un.org/treaties/t/canwfz_protocol/text.
[288] *Nuclear-Weapon-Free Zones*.
[289] Obama, "Remarks By President Barack Obama In Prague As Delivered."

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;groups such as and Proliferation Security Initiative, Global Initiative to Combat Nuclear Terrorism and Nuclear Security Summits; and norm and nuclear security culture building networks such as the World Institute for Nuclear Security and the International Nuclear Security Education Network. Reviewing these in details will be helpful to have a better understanding of nuclear security.

2.2.1. UN Security Council Resolution 1373

Immediately after the 9/11 attacks, the UN Security Council concentrated on counter terrorism efforts. As a result, on September 28, 2001, the UN Security Council adopted the Resolution 1373 as a result of which it created a proactive legislation to coordinate international efforts and counter international terrorism that proved having no limits for the level of lethality and destruction. The Resolution 1373 (2001) calls for member states to prevent and suppress financing of terrorist acts, to refrain from assistance to terrorism, to cooperate and enhance cooperation against terrorism, to become parties to international conventions and protocols (Paragraph 1, 2, 3). Also, the resolution highlights the connection between international terrorism and transnational illegal activities including movement of CBRN materials and obliges states to cooperate "to strengthen a global response to this serious challenge and threat to international security" (Paragraph 4). In addition, the resolution establishes a committee to monitors compliance with the resolution which is the United Nations Security Council Counter-Terrorism Committee (Paragraph 6).[290]

As the resolution was adopted acting under Chapter VII of the UN Charter, it is binding for all UN member states.[291] According to Eric Rosand, the resolution is a very important step as counterterrorism effort within the UN. Also for him, the aim of the resolution is

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[290] United Nations Security Council Resolution 1373, S/RES/1373 (United Nations, September 28, 2001), http://daccess-ods.un.org/access.nsf/Get?OpenAgent&DS=S/RES/1373(2001)&Lang=E.
[291] "The United Nations Response," *UN Chronicle* 38, no. 3 (2001): 6.

not to define terrorism or terrorists rather to "to raise the average level of government performance against terrorism across the globe". Thus, he adds that in general the resolution calls for states to review their domestic practices and laws so that terrorism cannot sustain itself.[292]

2.2.2. UN Security Council Resolution 1540

Being aware of the lack of international law that address the risk of terrorists' acquisition of WMD, the UN Security Council advanced its counter terrorism policies by adopting the Resolution 1540 to put pressure on all states to enforce these following provisions. The 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 law in order to prevent non-state actors from mentioned acts (Paragraph 2). Further, it calls for member state to take effective measure for preventing WMD proliferation and domestic control on related materials in production, use, storage and transport as well as to take effective border and export controls to prevent illicit trafficking of such items (Paragraph 3). Like Resolution 1373, it establishes a committee to monitor compliance with the resolution which is the 1540 Committee and Expert Group (Paragraph 4). The resolution also obliges member states to promote effectiveness of multilateral treaties related to WMD proliferation (Paragraph 8).[293]

This resolution is also binding for member states like previous resolution. Unlike the Resolution 1373, it has direct obligations concerning WMD proliferation. Thus, this constitutes an important step taken towards nonproliferation pillar of the regime.[294] Also, when the fact that the exposure of A.Q. Khan network played a crucial role in adoption

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[292] Eric Rosand, "Security Council Resolution 1373, the Counter-Terrorism Committee, and the Fight against Terrorism," *The American Journal of International Law* 97, no. 2 (2003): 333-34.
[293] United Nations Security Council Resolution 1540, S/RES/1540 (United Nations, April 28, 2004), http://www.un.org/en/ga/search/view_doc.asp?symbol=S/RES/1540(2004).
[294] Boureston and Ogilvie-White, *Seeking Nuclear Security through Greater International Coordination*, 3.

of the resolution is taken into consideration,[295] it directly offers a solution to a common problem when mechanisms of the regime fail to do so. Similarly, Peter Crail states that Resolution 1540 "fills existing gaps in the global nonproliferation regime".[296] Because, he thinks that while the regimes focuses on state proliferation, the resolution expands its scope by including non-state actor such as illicit networks and terrorists. Also, it is binding to all states as adopted acting under Chapter VII of the UN Charter, so it removes multilateral treaty procedures such as memberships, ratifications and withdrawals not only for nuclear nonproliferation but also other nonproliferation efforts.[297] It should be also noted that UN Security Council Resolution 1977 was adopted in 2011 which extended the mandate of 1540 Committee until 2021 and re-emphasized the importance of the Resolution 1540.[298]

Nonetheless, in spite of UN Security Council 1373 and 1540 bringing binding obligations to states, the implementation, especially of Resolution 1540, has been slow due to the several reasons including shortcomings in capacity to implement and political unwillingness.[299] In addition to these, there are several states opposing to the capacity of the UN Security Council to impose such binding obligations without referring to concrete security threat to peace.[300]

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

As a result of need for cooperation between states for the effective protection of nuclear materials, the Director General of the IAEA prepared a draft convention and sent to all IAEA members in 1977. After more than two-year long negotiations on the draft

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[295] Monika Heupel, "Surmounting the Obstacles to Implementing UN Security Council Resolution 1540," *The Nonproliferation Review* 15, no. 1 (2008): 95.
[296] Peter Crail, "Implementing Un Security Council Resolution 1540," *The Nonproliferation Review* 13, no. 2 (2006): 356.
[297] Ibid., 356-57.
[298] "Security Council Extends Mandate of 1540 Committee for 10 Years, Unanimously Adopting Resolution 1977 (2011)," United Nations, last modified April 20, 2011, accessed April 5, 2017. http://www.un.org/press/en/2011/sc10228.doc.htm.
[299] Heupel, "Surmounting the Obstacles to Implementing UN Security Council Resolution 1540," 96.
[300] Natalino Ronzitti, "WMD Terrorism," *Japanese Yearbook of International Law* 52 (2009): 178-79.

convention concerning physical protection of nuclear materials, the Convention on the Physical Protection of Nuclear Material was adopted in 1979 and opened for signature in 1980 and entered into force in 1987 under auspices of the IAEA.[301]

The convention states that it is applicable to nuclear materials used for peaceful purposes during international transport (Article 2) and calls for parties to the convention to take necessary steps to ensure protection of nuclear materials during international transport or process for international transport (Article 3). It obliges parties not to export, import or allow transit passage within their territories without receiving assurances for the protection of nuclear materials during the 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).[302]

In spite of having one hundred fifty-three parties to the convention, the CPPNM has a limited scope of international transport as the opposing states supported the domesticity of physical nuclear protection during the negotiations. However, threat of nuclear terrorism led to amendment process to expand scope of the convention which is the only legally binding agreement on physical protection of nuclear materials.[303]

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). Amendment also replaces Article 2 of the convention by expanding its application both to nuclear materials used for peaceful purposes in use, storage and transport, and to nuclear facilities; and by affirming the responsibility of a state for physical protection within that state (Paragraph 5). It requires parties to takes necessary steps in order to protect nuclear facilities against sabotage and minimize its possible

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[301] Maria de Lourdes Vez Carmona, "The International Regime on the Physical Protection of Nuclear Material and the Amendment to the Convention on the Physical Protection of Nuclear Material," *Nuclear Law Bulletin*, no. 76 (2005): 31-32.
[302] *Convention on the Physical Protection of Nuclear Material*, (1980), https://www.iaea.org/sites/default/files/infcirc274.pdf.
[303] "Convention on the Physical Protection of Nuclear Material (CPPNM)," Nuclear Treat Initiative, last modified May 8, 2016, accessed February 27, 2017. http://www.nti.org/learn/treaties-and-regimes/convention-physical-protection-nuclear-material-cppnm/.

consequences (Paragraph 6). Similarly, it obliges parties to criminalize the acts directed against the nuclear facilities (Paragraph 9).[304]

According to Peri Lynne Johnson, the Amendment brings, in sum, new physical protection requirements, extended criminalization provisions, and enhanced international cooperation.[305] In spite of its expanded nuclear security provisions, the Amendment could enter into force only after more than a decade from its adoption. For IAEA Director General Yukiya Amano, the entry into force of the Amendment not only reflects "the determination of the international community to act together to strengthen nuclear security globally" but also "will help reduce the risk of a terrorist attack involving nuclear material, which could have catastrophic consequences".[306] Similarly, Tariq Rauf points out that nuclear terrorism and its consequences go beyond the national borders but with the Amendment "the risks of nuclear terrorism and smuggling and illicit trafficking in nuclear materials are likely to be reduced".[307] However, he highlights the importance of the IAEA having central role only in assisting states, not in monitoring the compliance.[308] Similarly, some experts argue that there are some inherit problems concerning the CPPNM and its amendment. They state that the convention and its amendment neither allow a mechanism to evaluate state's physical protection standards nor require periodic reporting.[309] In other words, these experts highlight the lack of an international organization that could help states implement nuclear security standards and monitor implementation and compliance. So, without comprehensive nuclear security standards

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[304] *Amendment to the Convention on the Physical Protection of Nuclear Material*
[305] Peri Lynne Johnson, "Facilitating the Entry into Force and Implementation of the Amendment to the Convention on the Physical Protection of Nuclear Material: Observations, Challenges and Benefits," *Nuclear Law Bulletin*, no. 94 (2014): 17-21.
[306] Quoted in Anthony Wetherall and Vincent Fournier, "Key Nuclear Security Agreement to Enter Into Force on 8 May," International Atomic Energy Agency, last modified April 8, 2016, accessed February 27, 2017. https://www.iaea.org/newscenter/news/key-nuclear-security-agreement-to-enter-into-force-on-8-may.
[307] Tariq Rauf, "The Entry into Force of the Amendment to Convention on the Physical Protection of Nuclear Material," Stockholm International Peace Research Institute (SIPRI), last modified May 8, 2016, accessed February 20, 2017. https://www.sipri.org/commentary/2016/entry-force-amendment-convention-physical-protection-nuclear-material.
[308] Ibid.
[309] Boureston and Ogilvie-White, *Seeking Nuclear Security through Greater International Coordination*, 4.

and mechanism, the legally binding provisions of the convention and its amendment seems arbitrary rather than mandatory for all member states.

Apart from the Convention on the Physical Protection of Nuclear Material and Amendment, there are legally non-binding recommendations provided by the IAEA as a booklet which is titled as *The Physical Protection of Nuclear Material and Nuclear Facilities (INFCIRC/225).* There are several revisions to the booklet first one which was published in 1972.[310] The last one was published in 2011 under IAEA Nuclear Security Series as a result of which the booklet title was changed to *Nuclear Security Recommendations on Physical Protection of Nuclear Material and Nuclear Facilities*. The aim of the recommendations is to provide guidance to states in their efforts towards physical security for nuclear materials and nuclear facilities.[311]

Similarly, there is also *Code of Conduct on the Safety and Security of Radioactive Sources* which consists of also not legally binding recommendations published in 2004. It is applicable to all radioactive sources except the nuclear materials defined in the CPPNM. The aim of the recommendations is to achieve and maintain the safety and security of radioactive materials, to prevent unlawful acquisition of radioactive materials and to minimize radiological consequences.[312]

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

In 1996, UN General Assembly Resolution 51/210 established an *Ad Hoc* Committee aim of which was to prepare a convention for suppression of international terrorism including a convention directly addressing nuclear terrorism (Paragraph 9).[313] After nearly a decade

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[310] "The Physical Protection of Nuclear Material," International Atomic Energy Agency, accessed February 27, 2017. https://www.iaea.org/publications/documents/infcircs/physical-protection-nuclear-material.
[311] *Nuclear Security Recommendations on Physical Protection of Nuclear Material and Nuclear Facilities (INFCIRC/225/Revision 5), IAEA Nuclear Security Series No. 13* (International Atomic Energy Agency).
[312] "Code of Conduct," International Atomic Energy Agency, last modified December 02, 2016, accessed February 27, 2017. http://www-ns.iaea.org/tech-areas/radiation-safety/code-of-conduct.asp.
[313] United Nations General Assembly Resolution 51/210, *Measures to Eliminate International Terrorism*, A/RES/51/210 (United Nations, December 17, 1996), http://www.un.org/documents/ga/res/51/a51r210.htm.

long negotiations on the draft convention, 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 possess, use or threaten to use radioactive material with an intent to cause damage; or damages facilities with the same intent; or attempts to do so; or participate in, organize 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 such offences in their territories; to prohibit activities of people, groups or organizations that contribute to perpetration of such offences; to exchange information in accordance with the national laws and informing the UN and the IAEA (Article 7). Also, it urges parties to take measures for protection of radioactive material in consistent with recommendation of the IAEA (Article 8).[314]

The convention which has one hundred and eight state parties as of February 2017[315] has a key role in the establishment of nuclear security as an international norm. While it defines acts of nuclear terrorism, it also promotes cooperation among states and with the IAEA to prevent such acts.[316] Similarly, Paige Willan states that the convention has two aims which are to criminalize the possession or use of nuclear materials for acts of terrorism and to 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.[317] 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 a limited cooperation as neither the IAEA nor the UN has been entrusted with the role of monitoring compliance.[318]

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[314] *International Convention for the Suppression of Acts of Nuclear Terrorism*, (2005), http://www.un.org/en/sc/ctc/docs/conventions/Conv13.pdf.
[315] "International Convention for the Suppression of Acts of Nuclear Terrorism," United Nations, last modified February 27, 2017, accessed February 27, 2017. https://treaties.un.org/Pages/ViewDetailsIII.aspx?src=IND&mtdsg_no=XVIII-15&chapter=18&Temp=mtdsg3&clang=_en.
[316] Boureston and Ogilvie-White, *Seeking Nuclear Security through Greater International Coordination*, 3.
[317] Paige Willan, "The Convention on the Suppression of Acts of Nuclear Terrorism: An Old Solution to a New Problem," *Georgetown Journal of International Law* 39, no. 3 (2008): 530-31.
[318] Ronzitti, "WMD Terrorism," 185.

2.2.5. 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 safety of ships and security of crew and passengers, the International Maritime Organization was asked to prepare a convention concerning the unlawful acts directed towards the maritime navigation. So, 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 aim of the convention is to criminalize unlawful acts against maritime navigation including the seizure of ship by force, performing violence against crew or passengers, damaging ship, attempting or threatening to do so.[319]

However, there was a growing need for a revision in the SUA Convention after 9/11 attacks which led to the Protocol of 2005 to the Convention for the Suppression of Unlawful Acts against the Safety of Maritime Navigation in 2005.[320] According to this protocol, the following is accepted to commit offence: use of radioactive materials or biologic, chemical and nuclear (BCN) weapons against or on a ship; discharge of these from a ship; use a ship for intentional damage; 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).[321]

The 2005 Protocol carries importance for nonproliferation efforts as mere transport of WMD or related materials and technology is considered as an offence. Also, it promotes the regime by not applying its provisions on 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 a NPT member state. Therefore, while it prevents

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[319] "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," International Maritime Organization, accessed February 27, 2017. http://www.imo.org/en/about/conventions/listofconventions/pages/sua-treaties.aspx.
[320] Scott D. MacDonald, "The SUA 2005 Protocol: A Critical Reflection," *International Journal of Marine and Coastal Law* 28, no. 3 (2013): 485-86.
[321] *Protocol of 2005 to the Convention for the Suppression of Unlawful Acts against the Safety of Maritime Navigation* (2005), https://www.unodc.org/tldb/pdf/Protocol_2005_Convention_Maritime_navigation.pdf.

illicit shipments and other malicious acts, it does not prevent peaceful use of nuclear energy through exports and imports.[322]

2.2.6. Proliferation Security Initiative (PSI)

The Proliferation Security Initiative (PSI) is a voluntary partnership launched in 2003 which addresses the treat of WMD proliferation. It provides a platform for states to coordinate their activities for counter proliferation. Being a 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. Also, participant states commit to take necessary measures for their national facilities not being used for such trafficking. And PSI participant states endorse *PSI Statement of Interdiction Principles* and thus ensure to create effective and coordinated base for prevent WMD trafficking.[323]

Despite its non-binding structure, the PSI is seen successful as a result of more than two dozens of WMD-related interception, among which the *BBC China* which was transporting centrifuge parts to Libya through the A. Q. Khan network. Thus, its flexible and voluntary structure is seen as complementary to formal mechanisms.[324]

Nonetheless, there are similar concerns for the PSI like NSS process. Because, the initiative is seen as a component of U.S. dominance by some states. Also, there are some states that question the legality of interdiction actions which are conducted through the PSI not under UN structure, as a result they hesitate to participate.[325]

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[322] Ronzitti, "WMD Terrorism," 184.
[323] "Proliferation Security Initiative," Nuclear Threat Initiative, last modified September 3, 2015, accessed February 27, 2016. http://www.nti.org/learn/treaties-and-regimes/proliferation-security-initiative-psi/; "The Proliferation Security Initiative," Proliferation Security Initiative, accessed February 27, 2016. http://www.psi-online.info/Vertretung/psi/en/01-about-psi/0-about-us.html.
[324] Emma Belcher, *The Proliferation Security Initiative: Lessons for Using Nonbinding Agreements* (Council on Foreign Relations, International Institutions and Global Governance Program, July 2011), 1.
[325] Boureston and Ogilvie-White, *Seeking Nuclear Security through Greater International Coordination*.

2.2.7 Global Initiative to Combat Nuclear Terrorism (GICNT)

The Global Initiative to Combat Nuclear Terrorism (GICNT) is a voluntary partnership established in 2006 to strengthen global capability prevent nuclear terrorism. Having eighty-six member states and five international organizations as observers, the GICNT aims to integrate available resources to enhance global framework to combat nuclear terrorism. It also aims to bring together nonproliferation, counter-proliferation and counter-terrorism experience and expertise so as to constitute ground for states to share information in a non-binding environment.[326]

For its objectives, it has an agenda called as *Statement of Principles* consisting of objectives consistent with the UN Security Council 1373 and 1540, the CPPNM and the Nuclear Terrorism Convention.[327] This is why it creates no new international norms, organizations or procedures. Its voluntary structure creates flexibility for states while its being based upon international agreements contributes its legal basis. So it is possible to state for the GICNT that it not only reinforces international responses but also develops an informal environment to sustain them.[328]

2.2.8. 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".[329] Just like he stated, there has been four Nuclear Security Summits (NSS) which focused on the threat of nuclear terrorism as well as on enhancing and promoting existing mechanisms to prevent it.[330]

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[326] "Overview, Objectives, Products and Activities," Global Initiative to Combat Nuclear Terrorism accessed February 27, 2017. http://www.gicnt.org/ ; "Global Initiative to Combat Nuclear Terrorism (GICNT)," Nuclear Threat Initiative, last modified July 28, 2015, accessed February 27, 2017. http://www.nti.org/learn/treaties-and-regimes/global-initiative-combat-nuclear-terrorism-gicnt/.
[327] "Overview, Objectives, Products and Activities."
[328] Riccardo Alcaro, "The Global Initiative to Combat Nuclear Terrorism: Big Potential, Limited Impact?," *The International Spectator* 44, no. 1 (2009/03/01 2009): 111.
[329] Obama, "Remarks By President Barack Obama In Prague As Delivered."
[330] "NSS History," Nuclear Security Summit, accessed February 27, 2017. http://www.nss2016.org/about-nss/history/.

The first NSS was held in Washington, DC between 12-13 April 2010 and forty-seven head of state as well as three international organizations participated in it. These leaders agreed to provide effective security of nuclear materials, to decrease the use of weapons-usable nuclear materials in civilian sectors and to strengthen the nuclear security. The summit issued a communique and *Washington Work Plan* which provided guidance to enhance nuclear security such as ratifying or implementing treaties or resolutions concerning nuclear security, increasing assistance and cooperation both between states and with the IAEA.[331]

With the participation of new six states and one new international organization along with previous forty-seven states and three international organizations, the Seoul 2012 Summit had three main agenda topics which were cooperative measures to counter nuclear terrorism threat, protection of nuclear materials and nuclear facilities and prevention of illicit nuclear material trafficking. Building upon previous communique and work plan, this summit also issued its communique in which minimization of the use of highly enriched uranium (HEU), ratification of Amendment to the CPPNM and improving the security of nuclear materials were promoted.[332]

With the same number of participation as previous one, The Hague 2014 Summit focused primarily on increasing the cooperation between states and nuclear industry and enhancing global nuclear security measures.[333] And in the communique of final summit which was again held in Washington, DC in 2016, the overall process of NNSs was evaluated and the importance of nuclear security was reiterated.[334]

It is believed that NSSs strengthened the nuclear security not only by promoting the international mechanisms but also promoting minimization the use and amount of the HEU and plutonium. The NSSs played a key role in securing the necessary number of ratifications for the Amendment to the CPPNM of which entry into force was announced

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[331] "2010 - Washington, DC," Nuclear Security Summit, accessed February 27, 2017. http://www.nss2016.org/past-summits/2010/.
[332] "2012 - Seoul," Nuclear Security Summit, accessed February 27, 2017. http://www.nss2016.org/past-summits/2012/.
[333] "2014 - The Hague," Nuclear Security Summit, accessed February 27, 2017. http://www.nss2016.org/past-summits/2014/.
[334] "Nuclear Security Summit 2016 Communiqué," Nuclear Security Summit, last modified April 01, 2016, accessed February 27, 2016. http://www.nss2016.org/s/Communique-qdbv.pdf.

in 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. In addition, "several tonnes of HEU was repatriated to countries of origin and 'down-blended' into LEU, several regions became completely free of HEU".[335]

In the meantime, there are some criticisms towards NNS process, although there will be no new summit in this format. Even though main criticism is on commitments some of which has not been accomplished, summit process is also criticized for focusing mainly on civil nuclear materials which constitutes approximately %17 of the whole weapons-usable nuclear materials. In addition, there was a sense in some states during NSS process that the U.S. Government was using the process and threat of nuclear terrorism for preserving and advancing its strategic position.[336]

2.2.9. World Institute for Nuclear Security (WINS)

The World Institute for Nuclear Security (WINS) is an international non-governmental organization launched in 2008 of which 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 to promote training of nuclear security professionals. As it is stated in the WINS Governing Statue, WINS's mission is providing "an international forum for those accountable for nuclear security to share and promote the implementation of best security practices".[337]

The WINS working in a close relationship with the IAEA focuses on improvement security and physical protection of radioactive materials and nuclear facilities by sharing information and best practices. Accordingly, the WINS has coordinated the efforts of

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[335] "The Last Nuclear Security Summit," *Strategic Comments* 22, no. 3 (2016): vii.
[336] Ibid., vii-viii.
[337] "Governing Statute," World Institute for Nuclear Security, accessed February 27, 2017. https://www.wins.org/index.php?article_id=18&file=wins_statute.pdf.

3,500 members who are from more than 110 states in a such aim of sharing best practice to prevent nuclear terrorists from achieving their aims.[338]

2.2.10. International Nuclear Security Education Network (INSEN)

Similar to the WINS' activities, there is a network called International Nuclear Security Education Network (INSEN) which was established under the auspices of the IAEA Nuclear Security Programme in 2010. The aim of the network is to promote nuclear security through nuclear security education. Having an informal membership status, INSEN supports development of peer-reviewed textbooks, training and research programs of nuclear security.[339] Therefore, it plays a key role in development of nuclear security culture.

As an active member of INSEN, Şebnem Udum states that INSEN helps nuclear security culture develop through "faculty development courses". These courses aims to educate academicians about nuclear security so that they can lecture at their own classes which not only increase the awareness but also train new candidate experts of nuclear security. She also reminds that education of staffs who are working in nuclear facilities or have access to nuclear materials are highly important as they might be "innocent" insider threats without having the intention to be.[340] This means that educated personnel who is well aware of the existing and potential risks will lower the level of vulnerabilities that terrorists try to exploit.

As it can be seen through above-mentioned international responses to the threat of nuclear terrorism, states have started to cooperate against it. And these steps constitute the structure of nuclear security regime which will develop in time, like the international nuclear nonproliferation regime. However, unlike the international nuclear nonproliferation regime components, most of these international responses are voluntary

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[338] "World Institute for Nuclear Security," Nuclear Treat Initiative, accessed February 27, 2017. http://www.nti.org/about/projects/wins/.
[339] "International Nuclear Security Education Network (INSEN)," International Atomic Energy Agency, last modified September 29, 2015, accessed April 5, 2017. http://www-ns.iaea.org/security/workshops/insen-wshop.asp.
[340] Şebnem Udum, Interview by the author, Personal interview, Ankara, April 13, 2017.

and offer legally non-binding recommendations while there is insufficient or no mechanism to monitor compliance which, in return, cause vulnerabilities to be exploited. In addition, there are no comprehensive standards of nuclear security which means the absence of developed norms and culture. Yet, this does not necessarily mean that nuclear security regime does not exist at all. In fact, what is needed for an effective nuclear security regime are developed norms, culture and a status for participating states, and these are in the process of development. Similarly, increased awareness of the threat of nuclear terrorism plays an important role in effectiveness of nuclear security regime. From this point of view, the next chapter offers detailed discussion of the threat of nuclear terrorism to have a better understanding and moves to proposed approach to nuclear security.

CHAPTER III: NUCLEAR TERRORISM

This final chapter focuses on nuclear terrorism by giving detailed information about the acts of nuclear terrorism and terrorist groups that are more inclined to resort to such acts. While reviewing each act, this part provides a structure which includes incentives of different terrorist groups in connection with their intention and capability to resort to acts of nuclear terrorism. Next part of the chapter discusses possible scenarios and requirements of that act. In the final part of the chapter, the thesis proposes a suggestion for a comprehensive nuclear security regime.

Although the focus of the thesis is to analyze, not to assess, threat of nuclear terrorism, basic approach of threat assessment will be very helpful to better understand nuclear terrorism. At this point, J. David Singer's quasi-mathematical formulation offers best threat assessment which is "threat-perception = estimated intent x estimated capability".[341]

As this formulation was made during the Cold War, Singer offered a detailed explanation of the formula within the Cold War context. According to him, the British had a formidable military power, which was enough to cause extensive damage both to the U.S.S.R. and the U.S. However, he adds that, this capacity meant no threat to the U.S while the U.S.S.R. perceived the same capacity with considerable alarm.[342] By time, there has been some alterations to the formula, although most of them are identical to original one. In some cases, it is also possible to see some additional parameters to the formula the most frequently used of which are opportunity and vulnerability.[343]

According to Laqueur, prospects of terrorism have been increasing in relation with the increase in its potential destructiveness. This stems from the fact of rise both in the number of terrorist groups and in range of weapons available for them. The aggressive groups that embrace terrorism have different causes in their roots such as nationalism,

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[341] J. David Singer, "Threat-Perception and the Armament-Tension Dilemma," *Journal of Conflict Resolution* 2, no. 1 (1958): 94.
[342] Ibid.
[343] Vulnerability is assumed as "the extent to which a potential target is open to attack," while opportunity is accepted as a "favorable time or occasion for a threat actor in relation to a target." For more details, see Charles Vandepeer, "Rethinking threat: intelligence analysis, intentions, capabilities, and the challenge of non-state actors." (PhD, University of Adelaide, 2011), 17-18, 75.

fascism, religious fundamentalism and apocalypticism and have aims to acquire more destructive weapons such as WMD in addition to conventional weapons.[344] Not surprisingly, there are some terrorist groups that might show intention to conduct acts of nuclear terrorism. But before going further with how terrorist groups might conduct acts of nuclear terrorism, it will be more beneficial to start with which terrorist groups might have "nuclear" intentions. For, as stated above, threat assessment or threat perception consists mainly of two elements: intention and capability. As there has not been a successful nuclear terror attack, it would not be easy to understand the threat without acknowledging their potential intentions and capabilities. From this point, even though some deny even the possibility of a nuclear terrorist act,[345] the following part will focus on how real and urgent the threat of nuclear terrorism is.

3.1. WHO MIGHT BE A NUCLEAR TERRORIST?

As there are many different methods for nuclear terrorism which will be explained in details in the following part of this chapter, there are also different terrorist groups that might be more inclined to use one or more than one face of nuclear terrorism. Even though terrorism is violent in itself, not all terrorist groups are capable and in pursuit of nuclear level of violence because of the reasons illustrated below (Table 3).

Table 3 Criteria for Pursuing Acts of Nuclear Terror

	Acquisition of a Nuclear Weapon	**Constructing an IND**	**Sabotage of a Nuclear Facility**	**Radiological Dispersal Device**
Motivation	★★★★★	★★★★★	★★★★☆	★★★★☆
Organizational skills	★★★★☆	★★★★☆	★★★★☆	★★☆☆☆
Financial resources	★★★☆☆	★★★☆☆	★★☆☆☆	★☆☆☆☆
Technical skills	★★★☆☆	★★★☆☆	★★☆☆☆	★☆☆☆☆

★★★★★= extreme, ★★★★☆= very high, ★★★☆☆=high, ★★☆☆☆=moderate, ★☆☆☆☆= modest.

Source: Ferguson et al., *The Four Faces of Nuclear Terrorism*, 38-39.

[344] Walter Laqueur, "Postmodern Terrorism," *Foreign Affairs* 75, no. 5 (1996): 28.
[345] "Graham T. Allison: the Congenital Optimist," 5.

In the post-Cold War era, there has been always an attention to a potential threat of terrorists' using WMD in parallel with the increasing level of lethality in religious wave. Especially with the 9/11 attacks, terrorists' motivation and intention to cause mass destruction and casualties has been witnessed. While there is little doubt about terrorists' search of biological and chemical weapons to cause mass destruction, the highest level of threat stems from the pursuit of nuclear terrorism. Because, as stated in earlier chapters, terrorism targets more than its immediate victims. Therefore, terrorists want to conduct unprecedented acts that might attract much more attention than conventional explosives. By causing huge destruction and disruption with nuclear terrorism, terrorist might easily achieve their aims of reaching out to millions of target audience. From this point, terrorist groups that might pursue act of nuclear terrorism might be evaluated in three broad categorization: politico-religious groups, nationalist/separatist groups, and single-issue terrorists.[346]

No matter in which category a terrorist group is, there will be an assessment of how it will promote the strategic objectives and how it will reflect the ideology. While defining which type of nuclear terrorism will be resorted, terrorists will be expected to be influenced by potential vulnerabilities and ease of access to people, nuclear and radioactive materials, nuclear facilities as well as technical, financial and human resources. It should be also noted that increasing lethality of terrorist attacks implies the desire for deadlier possible attacks which following terrorist groups use nuclear terrorism as means to achieve.[347]

3.1.1. Politico-Religious Groups

One of the potential nuclear terrorist groups is politico-religious groups including apocalyptic ones. As clearly seen in Rapoport's last wave of terrorism, destruction caused by terrorists of these group are unprecedented because of its scope, targets, lethality and indiscriminative character. This nature of religious wave has been experienced in the

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[346] Even though Ferguson and his colleauges catergorize apocalyptic group seperately,they share many aspects of religious groups. Ferguson et al., *The Four Faces of Nuclear Terrorism*, 14-45.
[347] Ibid., 26-29.

Oklahoma City and World Trade Center bombings in 1993, the Hebron Massacre 1994 and on Tokyo underground in 1995 caused by Christian, Islamic, Jewish and Japanese Cult extremists, respectively. In spite of their different doctrines, practices, origins and institutions, their justifications for religiously motivated violence were defending and avenging their communities or apocalyptic reasons.[348] Because, according to these terrorists, their struggle is cosmic one between good and evil and death during this war is not a deterrent for a true warrior who sees violence as "the end in and of itself" even though it sounds contradictory.[349] Especially with the 9/11 attacks, religious violence started to be seen also as "the globalization of violence" because of easy export of violence ignoring borders.[350]

Both apocalyptic groups, who believe that world order will end soon and they must do contribution, and politico-religious groups, who dominated the post-9/11 terrorism, have aims of inflicting mass casualties. This approach of theirs might be well served with a nuclear capability and prestige along with it.[351] Especially, detonating an intact weapon or and IND might be very useful for apocalyptic groups' intentions as causing mass casualties, destruction and terror in order to accelerate the end of world is what they aim to achieve, after all. However, causing release of radiation as result of sabotage or detonation of a dirty bomb which might not result in mass casualties do not exactly fit into the expected consequences of apocalyptic terrorists. This very reason is believed to motivate Aum Shinrikyo for chemical weapons instead of nuclear ones for which they could not meet technical capabilities.[352]

On the other hand, politico-religious groups are expected to be more inclined to use any means of nuclear terrorism available.[353] From this point, al Qaeda has tried both acquiring nuclear devices and dirty bomb as former U.S. President Obama mentioned. He also mentioned "Islamic State"s[354] (IS) nuclear intentions by stating "if they ever got hold of

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[348] Magnus Ranstorp, "Terrorism in the Name of Religion," *Journal of International Affairs* 50, no. 1 (1996): 41-44.
[349] Phil Torres, "Apocalypse Soon?," *Skeptic* 21, no. 2 (2016): 56.
[350] Richard B. Miller, "The Problem of Religious Violence," in *Terror, Religion, and Liberal Thought*, ed. Richard B. Miller (Columbia University Press, 2010), 2.
[351] Ferguson et al., *The Four Faces of Nuclear Terrorism*, 18-19, 21.
[352] Ibid., 21-22.
[353] Ibid., 18-19.
[354] "Islamic State" terrorist organization is also called as ISIL, ISIS and DAESH.

a nuclear weapon or nuclear material, we have no doubt they'd use it".[355] This assumption is based on two main reasons. First, for any politico-religious groups such as IS or al Qaeda, acquisition of nuclear capability will have psychological effects on both targets and members as well as sympathizers. Second, detonation of such capability would directly mean achieving the strategic objective. Like apocalyptic groups, these terrorists might also try to fabricate IND which will serve for the same purposes, too.[356] It is also a good source of prestige to have such a capability, especially when there is a rivalry between terrorist groups for the leadership such as in the example of al Qaeda's "declaring war" on IS.[357] In addition to nuclear weapon and IND, causing release of radiation by sabotaging nuclear facilities or dirty bomb could serve the interests of these groups as both of them would bring psychological, financial and symbolic results even if it would not be valuable as former two acts. This might be seen in the case of Jose Cadilla. Because, Cadilla was directed by al Qaeda administration to build a dirty bomb to be exploded in the U.S even though he proposed to fabricate an IND at first which might be far from his and organization's capabilities of that time.[358]

When necessary capabilities are taken into consideration, especially more difficult acts of nuclear terrorism meaning detonation of an intact nuclear weapon and an IND require a huge organizational capability and financial resources as well as multinational operational and technical capability with central authority to provide coordination.[359] Even though these capabilities mean an unsurpassed threshold, religious terrorist organizations constitute a real threat to be the first to surpass. Other faces might not pose such difficulties for well-organized religious terrorist organizations such as al Qaeda and IS.

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[355] Barack Obama, "Weekly Address: Securing the World from Nuclear Terrorism," White House, Office of the Press Secretary, last modified April 2, 2016, accessed February 16, 2017. https://obamawhitehouse.archives.gov/the-press-office/2016/04/02/weekly-address-securing-world-nuclear-terrorism.
[356] Ferguson et al., *The Four Faces of Nuclear Terrorism*, 22.
[357] Selina Sykes, "Al Qaeda Declares War on ISIS As Evil Regimes Go Head to Head in Bloody Showdown," Express, last modified September 11, 2015, accessed February 16, 2017. http://www.express.co.uk/news/world/604496/Al-Qaeda-declares-war-ISIS-jihadis-terrorist-groups-bloody-showdown.
[358] Amanda Ripley, "The Case of the Dirty Bomber," Time, last modified June 16, 2002, accessed February 16, 2017 http://content.time.com/time/nation/article/0,8599,262917,00.html.
[359] Ferguson et al., *The Four Faces of Nuclear Terrorism*, 34-35.

3.1.2. Nationalist/Separatist Terrorist Groups

Contrary to apocalyptic groups that would prefer using nuclear weapon or IND rather than causing release of radiation as result of sabotage or detonation of a dirty bomb, nationalist/separatist groups would prefer vice versa. Most of these kind of groups are in pursuit of political objectives which would not be possible after the detonation of nuclear weapon or IND. Because, this would bring an overwhelming international protest and non-extremists supporters would disapprove such an act. However, possession of such capability would help them blackmail the opponent state to achieve its political objectives by providing proof of possession and intention of usage.[360]

Even though they would not cause incidents with nuclear yield, this does not mean that this kind of terrorist groups do not cause casualty and destruction. Because of their political agenda, these terrorists are believed to be in "a war of attrition" with states and cause casualties repeatedly in order to break the will of states to yield.[361] So, these terrorists might sabotage nuclear facilities with an aim of harming states' important infrastructure and financial sources as well as targeting public psychology. But, they would not target nuclear facilities which are located close to their so called "territories" in order not to cause harm to supporters. Moreover, they might even cause construction of new nuclear facilities which would mean the rejection of state's existence in the region for them. In fact, this particular incident happened when ETA activities resulted in stoppage of the Lemoniz Nuclear Power Plant construction.[362] Also, they might use dirty bombs which offers heavy psychological effects as well as destruction depending on the explosives used and comparatively lower level of radiological consequences of dirty bomb might not result in full closure of doors for negotiation.

When the necessary capabilities are evaluated for most of nationalistic/separatist terrorist groups, detonating an intact nuclear weapon or an IND might seem unlikely due to the

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[360] Ibid., 23-24.
[361] Ignacio Sànchez-Cuenca, "The Dynamics Of Nationalist Terrorism: ETA and the IRA," *Terrorism and Political Violence* 19, no. 3 (2007): 289.
[362] James M. Markham, "Spain Gets Warning on Basque Nuclear Plant," New York Times, last modified February 18, 1982, accessed February 17, 2017. http://www.nytimes.com/1982/02/18/world/spain-gets-warning-on-basque-nuclear-plant.html.

sophisticated requirements. However, attacking or sabotaging a nuclear facility might not pose such a challenge for nationalist/separatist terrorist groups, especially if there is an insider help. Similarly, dirty bombs are relatively much easier for many of the nationalist/separatist terrorist groups who are very familiar with conventional bombings.

3.1.3. Single-issue Terrorist Groups

Even though there has been only a little attention about single-issue terrorism, eagerness of some single-issue groups to resort violence for their causes requires a special attention within terrorism.[363] According to Davidson Smith, there are three principal issues related to single issue terrorism which are abortion, animal rights and environmentalism. For him, "single issue or issue-motivated terrorism can be understood as a form of anti-state terrorism that manifests itself as an extreme, illegitimate, and often violent response to a controversial issue within a given society". [364] On the other hand, Martha Crenshaw classifies these terrorists as reformist terrorists[365] as their violence is not directed to overthrow the government.[366]

Even though single-issue terrorists are not as "popular" as other terrorists such as religious or nationalist ones, they also have an important place in the nuclear terrorism equation, especially extremist environmentalists and anti-nuclear groups. Instead of detonating nuclear weapon, IND or dirty bomb, their focus would be on disclosing dangers of nuclear technology which might require to take over a nuclear facility.[367] This group of terrorists has been very active in the 1970s and 1980s as a result of nuclear power's rise as an alternative energy source. There were several attacks against nuclear facilities all around

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[363] Rachel Monaghan, "Single-Issue Terrorism: A Neglected Phenomenon?," *Studies in Conflict & Terrorism* 23, no. 4 (2000): 255.
[364] Quoted in Easson and Schmid, "250-plus Academic, Governmental and Intergovernmental Definitions of Terrorism," in *The Routledge Handbook of Terrorism Research*, 135.
[365] Martha Crenshaw, "The Causes of Terrorism," *Comparative Politics* 13, no. 4 (1981): 386.
[366] For a detailed information, see William Dyson, *The Emergence of Special-Interest/Single-Issue Terrorism* (Tallahassee, Florida: Institute for Intergovernmental Research, 2001).
[367] Ferguson et al., *The Four Faces of Nuclear Terrorism*, 24-25.

the world during their construction and non-operational periods as a result of which no radiation emission occurred.[368]

Reemergence of nuclear energy as a result of global warming might lead to similar incidents. Gavin Cameron calls acts of this kind of terrorist as "nuisance actions" which would not, intentionally, result in any serious damage to the environment. Trespassing and illegal entry to the nuclear facilities are among these actions. However, he also adds that destroying external power lines for temporary work stoppage or damaging railway lines to cause delays in transportation of nuclear materials are among the single-issue terrorist actions which even include bomb attacks.[369] For example, three anti-nuclear extremists were able to break into the Y-12 National Security Complex where five hundred tons of HEU is stored. They were also able to reach to HEU facility in the complex. But, finally a guard noticed them before they managed to move beyond spray-painting the exterior walls.[370] Unlike this incident, an anti-nuclear environmental extremist group, which called themselves as the Nuclear Liberation Front, detonated a bomb, located under a car, in parking lot of the Lawrence Livermore National Laboratory (LLNL) where nuclear weapons are designed.[371] Even though there was no casualty but destruction in the parking lot, it reflects how far single-issue terrorists might go.

Because of their limited resources and agenda, single-issue terrorists might only cause intentional but little incidents which would not include detonating a nuclear weapon and device or radiological device. However, they might cause unintentional release of radioactive materials while trying to expose dangers of nuclear technology. So, they pose relatively less threat which is still a threat, though.

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[368] Walter Laqueur, "Weapons of Mass Destruction," in *The New Terrorism: Fanaticism and the Arms of Mass Destruction* (New York: Oxford University Press, 2000), 70-74.
[369] Gavin Cameron, "Ideological Terrorism," in *Nuclear Terrorism: A Threat Assessment for the 21st Century* (New York: Palgrave Macmillan, 1999), 117-20.
[370] Lydia Dennett, "A Realignment Commission for National Labs: How to Downsize America's Bloated and Unsecure Nuclear Weapons Complex," *Bulletin of the Atomic Scientists* 70, no. 6 (2015).
[371] "Windows at A-Weapons Lab Hit by Debris in Bomb Blast," New York Times, last modified November 30, 1987, accessed February 18, 2017. http://www.nytimes.com/1987/11/30/us/windows-at-a-weapons-lab-hit-by-debris-in-bomb-blast.html.

Even though it is nearly impossible to state that other kind of terrorist groups would not prefer nuclear terrorism, terrorist groups such as right-wing and left-wing, social revolutionist etc. pose minimum amount of nuclear terrorism threat, at least for now.

3.2. THE FOUR FACES OF NUCLEAR TERRORISM

As it has been discussed in previous section, terrorists definitely have intention for the acts of nuclear terrorism. Yet, mere existence of intention would not be sufficient for nuclear terrorism. Because, unlike conventional explosives, each nuclear terrorist act requires higher levels of technical, financial and organizational skills. Some nuclear terrorist acts involving triggering a fission of nuclear material require so many resources and skills that only a few terrorist organizations can be considered to have this potential as discussed above. Nevertheless, as the capabilities differ for each terrorist group and depend on each different terrorist act, nuclear terrorism is "the most immediate and extreme threat to global security".[372] From this vein, there are generally accepted four different scenarios of nuclear terrorism. These are a) acquisition of an intact nuclear weapon, b) constructing an improvised nuclear device, c) sabotage of a nuclear facility and d) radiological dispersal device or "dirty bomb". At this point, Schmid's definition of nuclear terrorism includes these scenarios as following:

> nuclear terrorism is the use, or credible threat of use, of destructive force against noncombatant/civilian targets for purposes of propaganda, blackmail/extortion or intimidation of a target audience, whereby;
>
> a) the perpetrator has managed to trigger a fission (or fission/fusion) of nuclear material,
>
> b) is credibly held to be in possession of weapon-grade nuclear (U, Pu) material and signals intent of first use; or
>
> c) is attacking or sabotaging nuclear reactors or vital support systems (e.g. cooling system) at power stations or nuclear materials (e.g. reactor rods or high-radiation level waste) in transport or at storage sites in order to produce, then or later, an accident or a controlled release/explosion of radioactive substances, or
>
> d) disperses in water, soil or air radioactive waste or isotopes, etc. by conventional explosion or dispersion/diffusion.[373]

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[372] Obama, "Remarks By President Barack Obama In Prague As Delivered."
[373] Schmid, "Nuclear Terrorism: How Real is the Threat? Keynote Address," in *Measures to Prevent, Intercept and Respond to Illicit Uses of Nuclear Material and Radioactive Sources*, 16.

Instead of addressing these as scenarios or acts of nuclear terrorism, Charles D. Ferguson and his colleagues evaluates these as "faces of nuclear terrorism" and offer a detailed description of each face.[374] However, Allison only evaluates only first two faces as nuclear terrorism by stating "no nuclear weapons or material means no nuclear terrorism; it's that simple"[375] which is criticized for not having full scope of the problem.[376]

3.2.1. Acquisition of a Nuclear Weapon

Along with five NWSs, India, North Korea and Pakistan are known and Israel is believed to possess nuclear capability in their arsenals[377]. According to latest data available, the total number of nuclear weapons in possession of these nine states is assumed to be around 14,900 including the reserved but not dismantled nuclear weapons.[378] When it is evaluated from nuclear terrorism perspective, the vulnerability of these nuclear weapons depend on the categorization of nuclear warheads according to range and delivery systems. This categorization consists of two main parts which are strategic and non-strategic weapons which is known as tactical. Strategic weapons are assumed to have capacity of delivering nuclear warheads with the range of more than 5,500 kilometers which is accepted as intercontinental distance while non-strategic weapons are assumed to have range lower than intercontinental.[379]Amy Woolf states that strategic weapons are intercontinental ballistic missiles (ICBMs), submarine-launched ballistic missiles (SLBMs) and heavy bombers capable of carrying gravity bombs and cruise missiles, whereas non-strategic weapons are shorter range ones which are deployed close to the battlefield to be used by troops.[380] According to Andrew Futter, strategic nuclear weapons are the ones with high warhead yield specially designed for mass destruction and national

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[374] Ferguson et al., *The Four Faces of Nuclear Terrorism*.
[375] Graham Allison, "How to Stop Nuclear Terror," *Foreign Affairs* 83, no. 1 (2004): 69.
[376] William C. Potter, Charles D. Ferguson, and Leonard S. Spector, "The Four Faces of Nuclear Terror," *Foreign Affairs* 83, no. 3 (2004).
[377] Hans M. Kristensen and Robert S. Norris, "Status of World Nuclear Forces," Federation of American Scientists, last modified January 31, 2017, accessed February 9, 2017. https://fas.org/issues/nuclear-weapons/status-world-nuclear-forces/.
[378] Ibid.
[379] Ferguson et al., *The Four Faces of Nuclear Terrorism*, 48.
[380] Amy F. Woolf, *Nonstrategic Nuclear Weapons* (Washington, D.C: Congressional Research Service (CRS) March 23, 2016), 2, https://fas.org/sgp/crs/nuke/RL32572.pdf.

deterrence and capable of hitting targets within no range limitation. He also adds that non-strategic nuclear weapons have limited operation area and lower warhead yield but are designed for battlefield use against the enemy.[381]

As this particular categorization suggests, nuclear warhead based on SLBMs or ICBMs are not regarded as portable and approachable for terrorist. On the other hand, in addition to reserved nuclear warheads which are not mated on any kind of delivery means, non-strategic weapons are portable by their nature as well as cruise missiles designed for air and submarine launch.[382] When approximately 150 deployed non-strategic and 5,645 reserved nuclear warheads out of 14,900 are taken into consideration,[383] more than one third of nuclear warheads are direct targets of terrorists to acquire an intact nuclear weapons because of the following reasons. Most importantly, non-strategic weapons are comparatively smaller and older generations do not have permissive action links (PALs) which ensure nuclear weapons' not being used without the correct code. Also, these short range weapons are designed for forward deployment to be used in battlefield operations and as a result they are stationed outside of the source country. Similarly, non-strategic weapons for aircrafts and submarines are not kept in central storage sites which also increases the risk and attracts terrorists' attention.[384]

Having these technical and tactical background information, terrorist might acquire an intact nuclear weapons by making use of different vulnerabilities and opportunities. The worst possibility is the acquisition of nuclear weapons directly from a failing/failed or sympathetic state. Even though nuclear weapons are limited to only a few states, North Korea and Pakistan have a crucial point in creation of this kind of possibility. For example, terrorists might make use of a coup, revolution, political unrest or a period of anarchy in order to acquire an intact nuclear weapon via insurgents or by benefitting from turmoil. At this point, political atmosphere and radical groups in Pakistan contributes to the vulnerability of Pakistani nuclear weapons,[385] even though there are optimists who

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[381] Andrew Futter, "Testing, Defining and Delivering Nuclear Weapons," in *The Politics of Nuclear Weapons* (Los Angeles: Sage Publications, 2015), 37.
[382] Ferguson et al., *The Four Faces of Nuclear Terrorism*, 48.
[383] Kristensen and Norris, "Status of World Nuclear Forces."
[384] Ferguson et al., *The Four Faces of Nuclear Terrorism*, 61-76.
[385] Ibid., 59-61.

believe in Pakistan's nuclear weapon security and describe these allegations as exaggerated.[386] On the other hand, North Korea is assumed to contribute terrorism in various ways by providing training, missiles and other sources both to Hezbollah and Tamil Tigers according to some various reports. So, when North Korea's nuclear engagements with Syria, Iran and Libya is considered as well as its support to terrorism, the following lines become more meaningful "North Korea is well known as a nation-state that will sell anything to nation or non-state actor who will pay for it".[387]

However, it is also mentioned that even if there is such a possibility for terrorist to acquire an intact nuclear weapon directly from a state, the probability is quite low. Even though states might support terrorism, they would not be too careless to provide nuclear weapons while knowing it would be traced back to the provider state with the help of the science of nuclear forensics which is "the examination of nuclear and other radioactive materials … to determine the origin and history of this material in the context of … the assessment of nuclear security vulnerabilities".[388] Allison acknowledges this as the only thing which prevent terrorists from acquiring an intact nuclear bomb. Because, he adds, the essential point of a new deterrent is the science of nuclear forensics.[389]

But, instead of a sympathetic or failing/failed state, a senior official might assist terrorists to acquire nuclear weapons for ideological or financial reasons without approval of state authority. For example, Dr. Abdul Qadeer Khan, known as "father of the bomb" in Pakistan, admitted that he had provided sensitive information and sold nuclear designs and part to Iran including parts for P-1 and P-2 centrifuges. Also, he played a key role in Pakistan-North Korea relations starting from 1993 in order to improve his technology in exchange of missile technology for enrichment technology. Moreover, Khan worked even with Libya to create a nuclear weapon capability from scratch, unlike Iran and North

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[386] Charles P. Blair, "Fatwas for fission: Assessing the terrorist threat to Pakistan's nuclear assets," *Bulletin of the Atomic Scientists* 67, no. 6 (2015): 20.
[387] Bruce E. Bechtol, "Creating Instability in Dangerous Global Regions: North Korean Proliferation and Support to Terrorism in the Middle East and South Asia," *Comparative Strategy* 28, no. 2 (2009): 99-108.
[388] "Nuclear Forensics," International Atomic Energy Agency, accessed February 11, 2017. https://www.iaea.org/topics/nuclear-forensics.
[389] Graham Allison, "The Only Thing that can Keep Nuclear Bombs Out of the Hands of Terrorists is a Brand-New Science of Nuclear Forensics," *Newsweek* 153, no. 12 (March 23, 2009).

Korea that had some level of expertise on nuclear technology, then.[390] It should be also noted that there is a strong claims that Khan was not acting alone, rather Pakistan government used the A. Q. Khan network for proliferation[391] which, then, constitutes the ground for state level support. Not including the claims but considering the facts, it would not be wrong to assume that Khan would have assisted terrorists. Or there is no guarantee for senior officials of other states not involving in such activities. In fact, there is also possibility of other insider help such as technician, guards and low rank officials who might assist for ideological or financial reasons or be forced to assist terrorists through coercion or threats.[392] According to Ferguson and his colleagues, Russian nuclear weapons are more vulnerable to these kind of insider help because of the nuclear sites spread all over the country with security problems.[393]

Unlike the situation of directly acquiring an intact nuclear weapon with the help of sympathetic state or senior officials, terrorists should also overcome the safeguards in order to detonate it if they acquire it through other mentioned methods. In addition to PALs that most of the new nuclear weapons have, there is another safeguard called safing, arming, fusing and firing (SAFF) procedures. [394] All U.S. nuclear weapons as well as most of the Russian, French and British weapons are believed to have both PAL and SAFF technology whereas India, Israel North Korea and Pakistan apply different procedures, such as Pakistan's "three-man rule" for detonation. Consequently, terrorists should also have advanced technical expertise to bypass these codes and procedures.[395]

Assuming that terrorists manage to acquire an intact nuclear weapon through mentioned methods and bypass safeguards, the rest consists of transporting the weapon to target and detonating it which requires extensive resources and network. In case of a successful detonation; heat, shock waves, large amounts of radioactive fallout and radiation would be created causing extensive lethality, enormous damage to structures and loss of a huge

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[390] Matthew Manning, "Peeking into the Abyss: What Pakistan and The A.Q. Khan Network Tell Us About the Future of Nuclear Nonproliferation," *Texas Review of Law & Politics* 19, no. 2 (Spring 2015 2015): 315-17.
[391] Justin V. Hastings, "The Geography of Nuclear Proliferation Networks," *The Nonproliferation Review* 19, no. 3 (2012): 438.
[392] Ferguson et al., *The Four Faces of Nuclear Terrorism*, 58-59.
[393] Ibid., 61.
[394] Ibid., 61-63.
[395] Ibid.

area. It is clearly seen when the consequences of the Hiroshima bomb is taken into consideration which killed nearly 100,000 people and destroyed a whole city.[396] By minimizing the transportation and risk of detection, they might also detonate at less than optimal place which is also terrifying enough for potential target states. Or they might blackmail target states by proving their nuclear weapon possession.[397]

3.2.2. Manufacturing an Improvised Nuclear Device

Because of the low probability of acquiring an intact nuclear weapon and technical difficulties along with it, terrorist might try fabricating their own weapon, known as IND. For an IND, terrorists need to bring weapon-usable nuclear material and technical expertise together to fabricate IND while having complete secrecy during all stages.[398]

The nuclear materials that terrorist need to have for an IND do not exist in nature and are nearly impossible for terrorist to produce which are HEU and plutonium.[399] Huge amount of these materials have been produced by states for civilian nuclear energy and nuclear weapons and are kept in hundreds of sites around the world with lower level of security approach than nuclear weapons.[400] When the fissile material stocks are checked, the global stockpile of HEU is considered to be approximately 1370 (± 125) tons while the global stockpile of plutonium is around 500 tons including 270 tons of civilian purposes.[401] From this vein, the IAEA defines the amount of the nuclear material with the term of significant quantity (SQ) which is "the approximate amount of nuclear material for which the possibility of manufacturing a nuclear explosive device cannot be excluded".[402] And SQ equals to 8 kilograms of plutonium or 25 kilograms HEU for

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[396] For comparison, the Hiroshima bomb was equal to 10,000 times of the Oklahoma City bomb which used a few tons of TNT and caused nearly death of 200 people and huge damage to a building. P. Andrew Karam, "Radiological Terrorism," *Human and Ecological Risk Assessment: An International Journal* 11, no. 3 (2005): 503.
[397] Ferguson et al., *The Four Faces of Nuclear Terrorism*.
[398] Bunn et al., *The U.S.-Russia Joint Threat Assessment of Nuclear Terrorism*, 20.
[399] Bunn et al., *Preventing Nuclear Terrorism: Continuous Improvement or Dangerous Decline?*, 1.
[400] Ferguson et al., *The Four Faces of Nuclear Terrorism*, 106.
[401] "Fissile Material Stocks," International Panel on Fissile Materials, last modified July 29, 2016, accessed Februay 11, 2017. http://fissilematerials.org/.
[402] *IAEA Safeguards Glossary, International Nuclear Verification Series, No. 3* (Vienna: International Atomic Energy Agency, 2002), 23.

terrorists to fabricate a weapon.[403] Unlike nuclear weapons, it is difficult to have tight control on fissile materials as a result of which 16 confirmed incidents[404] involving failed incidents of selling or trafficking HEU or plutonium have been reported to the IAEA Incident and Trafficking Database (ITDB) from 1993 to December 31, 2015.[405]

Acquiring the fissile material is hardest part of this face, when the fact that producing HEU and plutonium took more than 90% of the Manhattan Project is taken into consideration.[406] Knowing this fact, it is nearly impossible for terrorist to produce their own fissile material from the beginning because of the required technology, expertise and financial capabilities as well as a nuclear facility. However, they might acquire fissile materials trough purchase, theft or gift from a sympathetic or failing/failed state, unauthorized senior or lower rank officials. Even though these are similar to the acquisition of an intact nuclear weapons, there are certain aspects on the acquisition of the fissile material that makes it more probable. For example, states might assist terrorists to acquire fissile materials and know-how information, knowing the fact that tracing back these is much more difficult than a whole intact weapon. Also, senior and other officials as well as other probable collaborators might be more inclined to this way, as loss of these materials might take some time to be detected. This might mislead them to believe in they would not be exposed. And, it is a known fact fissile materials are not protected as tight as nuclear weapons which is a clear implication of ITDB data where there are many incidents regarding fissile materials.[407] For example, six people were arrested in Moldova in 2011 while they were providing small amount of HEU sample which was believed to lead to sale of nine kilograms of HEU for $30 million.[408]

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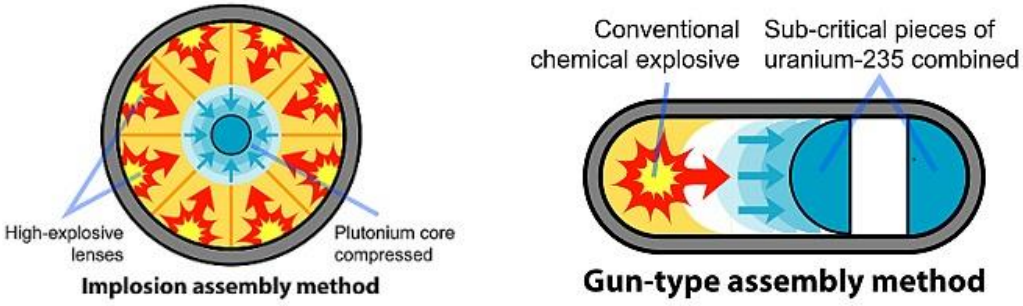
[403] It should be noted that this values depends on the enrichment percentage of HEU. For more details, see ibid.
[404] Some experts also include 5 reported incidents of plutonium beryllium neutron sources.
[405] The total number of reported incident, including unauthorized possession and related criminal activities, theft or loss and other unauthorized activities and events of radioactive sources, to the IAEA Incident and Trafficking Database is 2889. *Incidents of Nuclear and Other Radioactive Material Out of Regulatory Control: 2016 Fact Sheet* (International Atomic Energy Agency, Incident and Trafficking Database, 2016), 2, http://www-ns.iaea.org/downloads/security/itdb-fact-sheet.pdf.
[406] Bunn et al., *Preventing Nuclear Terrorism: Continuous Improvement or Dangerous Decline?*, 19.
[407] Ferguson et al., *The Four Faces of Nuclear Terrorism*, 118-31.
[408] Corey Hinderstein, Andrew Newman, and Ole Reistad, "From HEU Minimization to Elimination: Time to Change the Vocabulary," *Bulletin of the Atomic Scientists* 68, no. 4 (2015): 83-84.

Aum Shinrikyo and al-Qaeda are known to have dedicated its resources to acquire fissile materials in early 1990s. Even if they managed, or other terrorist groups managed, this would constitute only a step of IND. After acquiring fissile materials, there are generally accepted two methods to fabricate a IND: gun-type and implosion type.

Figure 1 Implosion-type and Gun-type Nuclear Weapons



Source: Types of Nuclear Weapons, http://www.ctbto.org/nuclear-testing/types-of-nuclear-weapons/

Gun-type method is accepted as the simplest version of nuclear explosive. Briefly, in this method, one sub-critical piece of U-235 is shot into another sub-critical piece of U-235 with the help of explosives which results in supercritical mass and then explosive chain reaction.[409] On the other hand, Mathew Bunn and Antony Wier offers a detailed description:

> "... chemical explosives detonate, shooting one piece of HEU toward another. When the pieces are close enough together, they become critical; when they meet, they are substantially supercritical. After neutrons begin the nuclear chain reaction, the reaction accelerates exponentially, so that each "generation" of fission splits more atoms and releases more energy than the one before. The energy released heats the uranium and turns it into a gas, which begins to expand, reducing the density and shutting off the chain reaction. From beginning to end, the chain reaction takes only a few millionths of a second".[410]

However, gun-type method is seen as an inadequate way of exploding HEU when compared to implosion-type method. Because, it is comparatively slow to create a supercritical mass and does not lead to any change in the density of fissile material. This

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[409] "Types of Nuclear Weapons," Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization, accessed February 12, 2017. http://www.ctbto.org/nuclear-testing/types-of-nuclear-weapons/.

[410] Matthew Bunn and Anthony Wier, "Terrorist Nuclear Weapon Construction: How Difficult?," *The Annals of the American Academy of Political and Social Science* 607 (2006): 140.

is why it best works with weapon-grade HEU which has 90% enrichment. However, even HEU with lower enrichment percentage will cause an explosive chain reaction such as the Hiroshima bomb which used approximately 60 kilograms of 80% enriched uranium.[411]

Even though its simple design and construction with a few skillful members, terrorists cannot use gun-type method if they acquire plutonium as it will not have a huge nuclear explosion because of slow speed of the critical mass. Instead, they would have to use implosion-type weapon which creates an explosive chain reaction with both HEU and plutonium.[412] As shown in Figure 1, implosion-type weapons "use a set of shaped explosives arranged around a less-than-critical mass of HEU or plutonium to crush the atoms of material closer together. This increases the chance that whenever one of those atoms splits and releases neutrons, those neutrons will hit and split another atom setting off a nuclear chain reaction".[413] Unlike gun-type, implosion-type needs less amount of fissile material. For example, the Nagasaki bomb used 6 kilograms of weapon-grade plutonium. However, this type poses great challenges to the terrorists as it requires more sophisticated technical information such as precision timing, exact amount of compression and extensive testing which automatically increases the possibility of detection.[414]

Assuming terrorists managed to fabricate an IND in either type, there would be uncertainty about its viability or nuclear yield capacity which terrorist would not learn until the detonation.[415] In sum, acquiring the fissile materials, recruiting skillful members, expanding nuclear expertise and fabrication an IND have different challenges in every single step of the operation. In spite of these major challenges, it is stated that "fabrication of at least a "crude" nuclear device was within capabilities of al Qaeda, if it could obtain fissile material".[416] With the dramatic rise of the IS, it is stated that IS has more financial

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[411] Charles D. Ferguson and William C. Potter, *Improvised Nuclear Devices and Nuclear Terrorism* (Stockholm: Weapons of Mass Destruction Commission Report No. 2, 2006), 11.
[412] Ibid., 15.
[413] Bunn and Wier, "Terrorist Nuclear Weapon Construction: How Difficult?," 140.
[414] Ibid., 141-42.
[415] Bunn et al., *The U.S.-Russia Joint Threat Assessment of Nuclear Terrorism*, 20.
[416] *Report to the President of the United States* (Commission on the Intelligence Capabilities of the United States Regarding Weapons of Mass Destruction, March 31, 2005), 276.

and human resources than even al Qaeda's the strongest times. In addition, the apocalyptic ideology of IS, as well as its indiscriminative attacks and horrible show of cruelties, might lead to attempts concerning nuclear terrorism.[417]

As previous two faces of nuclear terrorism have major challenges for terrorists to overcome which requires intensive investment in members, information, technology, and causes depletion of resources, terrorist groups might choose to sabotage nuclear facilities or disperse radioactive material which constitutes other two faces of nuclear terrorism.

3.2.3. Sabotage of a Nuclear Facility

After 9/11 attacks, there has been serious concerns regarding terrorists' possible attempts to use the same method of hijacking airplanes, the dominant sign of the new left wave, for nuclear facilities. These kind of concerns are considered as sabotaging nuclear facilities.[418] While any outside attack to nuclear plants will not result in nuclear explosion, it might cause release of huge amount of radiation resulting in billions of Dollars economic loss, psychological stress, heavy health problems and social disruption, not necessarily causing immediate death of masses.

3.2.3.1 Targeting Critical Infrastructure

According to the Power Reactor Information System, governed by the IAEA, there are 60 nuclear power reactors under construction in addition to 449 nuclear power reactors operating in 32 states.[419] Irrespective of reactor technologies, all of these reactors have cooling and moderating systems. For example, normal water works as both coolant and moderator in light water reactors (LWR) while carbon dioxide and graphite are used as coolant and moderator respectively in gas cooled reactors (GSR).[420] And in case of loss of reactor coolant flow, reactor core might take extreme damages resulting in melting

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[417] Bunn et al., *Preventing Nuclear Terrorism: Continuous Improvement or Dangerous Decline?*, 18.
[418] Bunn et al., *The U.S.-Russia Joint Threat Assessment of Nuclear Terrorism*, 20.
[419] "The Database on Nuclear Power Reactors," Power Reactor Information System, the IAEA, last modified February 12, 2017, accessed February 13, 2017. https://www.iaea.org/PRIS/home.aspx.
[420] For more details and reactor types, see Ferguson et al., *The Four Faces of Nuclear Terrorism*, 197-203.

down of reactor core and releasing radioactive substance. Because of this very reason and importance of coolant system, reactors are designed to have backup systems that intervenes in case of emergency. If emergency systems fail, containment structure of the reactor which is made of steel reinforced concrete will prevent the release of radioactive substance. So, it would not be wrong to state that nuclear plants have necessary safety systems which ensure safe plant operation against any potential accidents.[421]

However, there has been two major nuclear accidents even though there has been extensive focus on safety of nuclear facilities. When both the Chernobyl and Fukushima accidents are taken into consideration, it is not a far option for terrorists to try and get similar results of what accidents caused. Because, even though the tsunami is believed to cause the accident in Fukushima, it is coolant systems including emergency ones that could not operate without the electricity cut off by the tsunami and caused melting down of fuel rods.[422] Also, the root causes of the Chernobyl accident are believed to be "insufficient understanding and respect on the part of the operators with regard to the safety aspects of operational and test procedures" in addition to serious design deficiencies.[423] Unfortunately, these vulnerabilities of nuclear facilities might be exploited by terrorist groups. Similarly, writing before the Fukushima accident, Mikhail Gorbachev, former President of the Soviet Union, point out that possible results of nuclear terrorism is a great concern and vulnerabilities of nuclear materials and facilities including reactor fuel, dry storage cask and spent fuel pools should be well considered. He also adds that unlike accidental nature of the Chernobyl disaster, terrorist might cause intentional disasters.[424]

By sabotaging nuclear facilities no matter which methods are used, such as damaging cooling systems, intentionally forcing safety systems malfunctioning, etc., terrorists' aim might be either releasing radioactive substance and causing social, political and economic

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[421] Ibid., 199-203.
[422] Akira Nakamura and Masao Kikuchi, "What We Know, and What We Have Not Yet Learned: Triple Disasters and the Fukushima Nuclear Fiasco in Japan," *Public Administration Review* 71, no. 6 (2011): 894.
[423] Lars Högberg, "Root Causes and Impacts of Severe Accidents at Large Nuclear Power Plants," *Ambio* 42, no. 3 (2013): 274-75.
[424] Mikhail Gorbachev, "Chernobyl 25 years later: Many lessons learned," *Bulletin of the Atomic Scientists* 67, no. 2 (2011): 79.

damage, or just the latter, unfavorably for them, with a failed attempt.[425] These facilities might be power plants, spent fuel storage sites, reprocessing plants and research reactors as well as transportation vehicles.

3.2.3.2 Suicidal Airplane Crashes

Especially after 9/11 attacks in which commercial airplanes were hijacked to be used as an "unconventional" WMD, the possibility of terrorists' suicidal airplane crashes over nuclear facilities raises serious concerns. Following the attacks, then-the IAEA public Information Director David Kyd stated that older nuclear plants built during 1960s and 1970s were designed to resist smaller aircrafts which were the generally used types of the time. However, he added that those designs would not probably resist to a possible attack with bigger plane full of fuel.[426] As a natural result of growing concern toward this particular method, the Nuclear Energy Institute (NEI) and the Electric Power Research Institute (EPRI) sponsored an analysis of which detailed findings were not released publicly due to the security considerations. However, in a summary report, it was stated that containment structure of reactors can resist to airplane crashes similar to the 9/11. The summary report also highlighted that both used fuel storage and dry storage pools as well as used fuel transportation containers can withstand a commercial airplane crash to the point of not releasing radiation even though there would be local collapse and crush.[427]

Nonetheless, it should be noted that the result of report reflects the durability of U.S nuclear facilities which are subject to licensing conditions of the U.S. Nuclear Regulatory Commission (NRC). For this reason, assuming all nuclear facilities all around the world have same level of durability would lead to undesired results.

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[425] Bunn et al., *The U.S.-Russia Joint Threat Assessment of Nuclear Terrorism*, 20-21.
[426] Quoted in Steven Dolley, "NRC and Nuclear Industry Claims Regarding the Ability of Nuclear Power Plant Containments to Withstand Aircraft Crashes " Nuclear Control Institute, last modified September 24, 2001, accessed February 24, 2017. http://www.nci.org/01nci/09/npp-planecrash-quotes.htm.
[427] For more details, see *Deterring Terrorism: Aircraft Crash Impact Analyses Demonstrate Nuclear Power Plant's Structural Strength* (Electric Power Research Institute 2002), https://www.nei.org/CorporateSite/media/MemberFiles/Backgrounders/Reports-Studies/EPRI_Nuclear_Plant_Structural_Study_2002.pdf?ext=.pdf.

3.2.3.3 Other Sabotage Methods

In addition to sabotaging critical infrastructure and suicidal airplane crashes, terrorist might also try vehicle bombs which might be more disruptive effect rather than destruction as they would not get close enough. They might also try waterborne attacks as most of the power plants are constructed near lake, river or sea for external cooling water. Or they might directly launch an assault by land. Unlike nuclear weapon storage sites which are protected by armed soldiers, civilian nuclear facilities are protected with hired security forces which increases the vulnerability.[428] In addition, terrorist might use cyber-attacks to gain access to command and control systems of nuclear facilities.

The success rate of these methods might be also enhanced with the help of an insider who might provide information about plant structure, location of vital equipment and assistance during an attack. Or an insider might act alone to cause malfunctioning of facility systems.[429] Also, an insider is not necessarily to be member of terrorist organization, meaning that officials and workers of nuclear facilities might be forced to work with terrorists. For example, it is stated that IS supporters made hours of surveillance possibly to kidnap a senior official working at a Belgian nuclear research center, SKN-CEN, for this reason.[430]

3.2.4. Radiological Dispersal Device (Dirty Bomb)

Among four faces of nuclear terrorism, radiological dispersal device (RDD) is more likely for terrorist to use than nuclear ones.[431] As for definition, RDD is "any device that causes the purposeful dissemination of radioactive material without a nuclear detonation".[432]

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[428] In Force-on-Force security inspections made by NRC before 9/11 attacks, almost 50% of the time mock terrorist groups managed to breach power plant guard forces. Ferguson et al., *The Four Faces of Nuclear Terrorism*, 220.
[429] Ibid., 216-25.
[430] Bunn et al., *Preventing Nuclear Terrorism: Continuous Improvement or Dangerous Decline?*, 18.
[431] There are also radiation emission devices (RED) which emit radiotion locally. Unlike RED which might be used explosives, these devices do not require explosives, though. Ferguson et al., *The Four Faces of Nuclear Terrorism*, 259.
[432] "Radiological Dispersal Devices (RDDs): Dirty Bomb, Other Dispersal Methods," U.S. Department of Health and Human Services, Radiation Emergency Medical Management, last modified December 19, 2016, accessed February 15, 2017. https://www.remm.nlm.gov/rdd.htm.

Because of its most anticipated dispersal method, RDD is used interchangeably with "dirty bomb" which is a kind of RDD combining conventional explosive with radioactive material.[433] Despite being categorized under nuclear terrorism, radioactive materials in dirty bombs does not cause an explosion on their own, rather these materials are dispersed with the effect of explosion caused by the conventional explosives.[434] As a result, a dirty bomb cannot cause level of destruction compared to an intact nuclear weapon or an IND. However, conventional explosives and radioactive materials are relatively easier to obtain for terrorists. Radioactive materials are used for many civilian purposes such as cancer treatment, oil well logging, industrial radiography, food sterilization, detection of liquid flow through pipes, thickness measurement and scientific research. And keeping record of these materials is not so sensitive even in highly developed states.[435]

Even though the ITDB does not directly publish the number of incidents only related to radioactive material, the total number of incident reaching 2889 including incidents of both nuclear and other radioactive material indicates the depth of illicit trafficking.[436] From this perspective, there are quite surprising examples of terrorists' acquisition or attempt of acquiring radioactive materials. For example, even before 9/11 attacks, Chechen separatists threatened to use a dirty bomb which was made with nearly 32 kilograms mixture of cesium-137 (Cs-137) and conventional explosives in Moscow in 1995.[437] In addition, an al Qaeda terrorist, Dhiren Barot, was sentenced to life imprisonment as he plotted to set off a dirty bomb made out of 10,000 smoke detectors[438] each of which contains americium-241 (Am-241).[439] For similar reasons, two gauges

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[433] "Fact Sheet on Dirty Bombs," U.S. Nuclear Regulatory Commission, last modified December 12, 2014, accessed February 15, 2017. https://www.nrc.gov/reading-rm/doc-collections/fact-sheets/fs-dirty-bombs.html.

[434] James M. Acton, M. Brooke Rogers, and Peter D. Zimmerman, "Beyond the Dirty Bomb: Re-thinking Radiological Terror," *Survival* 49, no. 3 (2007): 51.

[435] Ferguson et al., *The Four Faces of Nuclear Terrorism*, 259-60; Acton, Rogers, and Zimmerman, "Beyond the Dirty Bomb: Re-thinking Radiological Terror," 151-53.

[436] For detailed information, see *Incidents of Nuclear and Other Radioactive Material Out of Regulatory Control: 2016 Fact Sheet*.

[437] Graham Allison, "Nuclear Terrorism: How Serious a Threat to Russia?," Belfer Center for Science and International Affairs, accessed May 12, 2017. http://www.belfercenter.org/publication/nuclear-terrorism-how-serious-threat-russia.

[438] Jason Bennetto, "Mass Panic was Aim of £70,000 Dirty Bomb," Independent, last modified November 7, 2006, accessed February 15, 2017. http://www.independent.co.uk/news/uk/crime/mass-panic-was-aim-of-16370000-dirty-bomb-423425.html.

[439] Americium-241 is made in nuclear reactors, and is a decay product of plutonium-241. For more information, see "Smoke Detectors and Americium," World Nuclear Association, last modified July

which are used for well logging and contain Am-241 were stolen in Southern Niger Delta region. Stolen devices were found in wreck metal shipment only 8 months later in Germany.[440] Similarly, Nilsu Gören evaluates both cases in November 2015 which are the stolen ten grams of radioactive iridium-192 (Ir-192) from a facility in Iraq and above-stated surveillance of Belgian nuclear official by the IS as terrorists' interests in dirty bombs.[441]

After terrorists acquire radioactive materials similar to previous faces as well as from less protected and more common civilian usage, a dirty bomb is not a complicated design for a competent terrorist group. However, more technical capabilities are required in order to detonate the bomb and get efficient contamination of a large area. Nonetheless, these steps might be much easier than previous faces.[442] According to James Acton and his colleagues, "dirty bombs may not be weapons of mass destruction, but they are weapons of mass disruption"[443] because of the fact that a successful attack of dirty bomb might not possible reach to three figures. They also mention that if people take necessary caution after a dirty bomb explosion such as leaving the area and decontaminating themselves, they might not face lasting harm in future, too. Further, they state that except the ones killed by explosion, "the only people likely to be killed or seriously injured by radioactivity are the small number who are alive but immobile following the initial blast, and very close to the site".[444]

Similarly, Andrew Karam points out that the physical damage caused by dirty bomb is limited to damage caused by the bomb itself, not by radiation. On the other hand, he adds that there might be long term health effects depending on the characteristics of radioactive material as well as economic and physiological effects.[445] At this point, Robin Frost states that even though most of anticipated dirty bombs have low level of lethality, some certain radioisotopes might cause more destruction. He uses cobalt-60 (Co-60) as an example

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2014, accessed February 15, 2017 http://www.world-nuclear.org/information-library/non-power-nuclear-applications/radioisotopes-research/smoke-detectors-and-americium.aspx.

[440] Acton, Rogers, and Zimmerman, "Beyond the Dirty Bomb: Re-thinking Radiological Terror," 155.

[441] Nilsu Gören, "Re: Nukleer Terorizm Konulu Tez Hk.," E-mail communication with the author, April 25, 2017.

[442] Ferguson and Potter, *Improvised Nuclear Devices and Nuclear Terrorism*, 279.

[443] Acton, Rogers, and Zimmerman, "Beyond the Dirty Bomb: Re-thinking Radiological Terror," 152.

[444] Ibid.

[445] Karam, "Radiological Terrorism," 503-04.

which is produced in nuclear reactors and used widely in food industry for irradiation and in health sector for sterilization and radiotherapy. According to this example which was one of the RDD scenarios used for the U.S. Senate Committee on Foreign Relations by the Federation of American Scientists (FAS), a detonation of a RDD made with Co-60 might be comparable to the contamination of the Chernobyl accident.[446] Moreover, if terrorists have more competence and resources, they might even use spent reactor fuel for RDD. A detonation of such RDD might be as high as six times lethal dosage which might extend its lethality up to one kilometer circle.[447]

This part of the chapter showed which terrorist groups might prefer nuclear terrorism and how they might exploit vulnerabilities trough different scenarios. By doing so, this part presented how real and urgent the threat of nuclear terrorism is before moving forward with proposed approach.

3.3 PROPOSED APPROACH TO NUCLEAR SECURITY

If the Singer's quasi-mathematical formulation is taken into consideration, the threat of nuclear terrorism requires utmost attention to be minimized. Taking Singer's formulation as basis, nuclear security formulation would be:[448]

threat-perception of nuclear terrorism = (estimated capability of terrorists x estimated intent of terrorists) – nuclear security

From this point, previous parts of this chapter showed capabilities and intention of various terrorist organizations. While both capability and intention vary for every terrorist organization, it might be stated that there are terrorists both have capability and intention for each act of nuclear terrorism. As it has been stated earlier, terrorists want to reach out to target audience rather than only to immediate victims. By creating huge explosions, sensational attacks and causing so many deaths as well as physiological disruption with nuclear terrorism, they might easily get one more step closer to their aims. Even in the least destructive and lethal form of nuclear terrorism, terrorists would get this sense of

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[446] Robin M. Frost, "Dirty Bombs: Radiological Dispersal and Emission Devices," *The Adelphi Papers* 45, no. 378 (2005/12/01 2005): 77.
[447] Ibid., 78.
[448] Bunn et al., *Preventing Nuclear Terrorism: Continuous Improvement or Dangerous Decline?*, 26.

triumph if they managed to explode a dirty bomb in a symbolic place in cities in the West such as Washington D.C., London, Paris, Berlin.[449]

Various mechanisms have been formulated to cope with the threat of WMD terrorism which occupied a prominent place on 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. And UN Security Resolution 1540 (2004) aims to prevent 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 Nuclear Terrorism Convention enhance the physical protection of nuclear material and facilities, and criminalize faces of nuclear terrorism, respectively. Both conventions also promote cooperation between states for prevention of nuclear terrorism. Similarly, the GICNT provides a voluntary partnership to bring different resources together against nuclear terrorism while it provides an informal environment to sustain above-mentioned attempts. In addition to contributing to the awareness of the threat of nuclear terrorism, Nuclear Security Summits, WINS and INSEN not only promote nuclear security but also develop nuclear security culture by increasing awareness through high level statesmen, professionals and academics.

However, as Mustafa Kibaroğlu states and as it was discussed in details in chapter 2, "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".[450] Similarly, Gören states that "the day-to-day implementation of the technical, legal, and regulatory aspects of nuclear security remains

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[449] Udum, Interview by the author. As stated earlier, Udum is an active member of INSEN which is why the interview is made with her.
[450] Mustafa Kibaroglu, "The Threat of Nuclear Terrorism Requires Concerted Action," *Strategic Analysis* 38, no. 2 (2014): 214.

as the biggest challenge, since the security of nuclear materials is not on high priority of governments everywhere".[451]

In addition, the lack of political will impairs the effectiveness of the existing nuclear security efforts. For instance, having largest stocks of HEU and plutonium, Russia had been suspicious about the U.S. leadership of the NSS process and perceived the threat of nuclear terrorism as a tool of the U.S. national interest for preserving and advancing its strategic position. As a result of deteriorating relations with the West after the Ukraine crisis in 2014, Moscow drew away from the NSS process.[452] Similarly, there is also an argument that the NSS process reflected the U.S. national interests as the U.S. government did not count some states in this process, such as Belarus, Iran and North Korea and some other states with a considerable amount of HEU.[453]

On the other hand, 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.[454] Similarly, China and few other states such as Indonesia and Malaysia criticize the PSI process and its legality which operate outside the UN framework and reject joining there.[455] As a result, these issues raise the question of political will which is related to 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, the thesis believes that Regime Theory serves for mutual interests by offering solutions for common problems such as the threat of nuclear terrorism. In addition, Regime Theory also 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 as well as principles, norms, rules and decision-making procedures. And, as a successful example

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[451] Gören, "Re: Nukleer Terorizm Konulu Tez Hk."
[452] "The Last Nuclear Security Summit," viii.
[453] Ibid.
[454] Heupel, "Surmounting the Obstacles to Implementing UN Security Council Resolution 1540," 96.
[455] Boureston and Ogilvie-White, *Seeking Nuclear Security through Greater International Coordination*, 8.

of the international regimes, the international nuclear nonproliferation regime minimizes traditional state-level threat of nuclear war and further proliferation while promoting 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 NWSs assuming the leadership of the process, this regime improves itself by evolving in accordance with the circumstances as in the case of RevCons and the AP in order to eliminate dysfunctional of insufficient sides. Therefore, it presents a good example of an international regime to inspire similar international efforts.

Table 4 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
International norms	developed	developing
Culture	developed	developing
Status	developed	developing
Awareness	high	low
Leadership	settled	conflictual

So, in order to strengthen existing nuclear security regime and minimize the threat of nuclear terrorism, the thesis humbly suggests that existing nuclear security regime should have all pieces of an international regime and fully developed norms and nuclear security culture. This means that implementation of concerning international rules and laws would be monitored by an international organization which sets comprehensive nuclear security standards and violations. In addition, there would be more groups and new NGOs that covers all aspects of nuclear security related issues. These would be enhanced through developed norms and nuclear security culture which would give sense of belonging and status for the participating states and motivate them. Increased level of awareness would also promote these steps by leading states to take necessary action against the threat to global security. Then, such a nuclear security regime would create more expectations for

member states that share a mutual interest in prevention of nuclear terrorism. This would also ease the question of leadership and political unwillingness. Because, it would enhance cooperative habits, oversee compliance and sanction defectors which are key missing elements of nuclear security. 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 sense of belonging and status.[456]

As the most notable example of international regimes, the international nuclear nonproliferation regime can and would inspire nuclear security. Because, through time, principles, norms, rules and decision making procedures of the international nuclear nonproliferation regime and its mechanisms to implement and monitor its provisions have improved, whereas a regime on nuclear security still needs time to be fully developed. By building on these developed norms and status of the international nuclear nonproliferation regime which are the responsibilities of NWS and NNWS to implement safeguards and disarmament, 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 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 process for common problems, nuclear security norms and status would contribute to 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 contribute to the raising awareness and the development of nuclear security culture without causing panic.[457] Actually, 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 Washington, DC summits both in 2010 and 2016, Seoul summit in 2012 and the Hague summit in 2014. Yet, in the shadow of knowing the fact that there would be no new NSS at this level, education and

[456] Udum, Interview by the author.
[457] Ibid.

communication would be leading element in increasing awareness. These steps would help nuclear security regime not only alleviate problems such as self-interested calculations, unawareness and lack of universal definition of terrorism but also promote itself as a more effective international regime.

In this case where nuclear security regime would be inspired from the international nuclear nonproliferation 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 authority to develop, improve and verify nuclear security standards as well as to implement them and monitor compliance of states. 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 evolutionary side of international regimes, there would be review conferences for CPPNM and ICSANT in order to discuss and bring solutions for problems of nuclear security regime with international law the process of negotiation of which involves all affected countries. So, an international nuclear security regime inspired by the international nuclear nonproliferation 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 global threat, the responses to it should be also global. Yet, regional steps to create and develop standards and compliance measures on nuclear security would support existing nuclear security regime of which legal foundation could be accelerated with wider participation in existing international efforts.[458] Then, such an international regime would bring all states together to respond the most important threat to the global security. Because this regime would address to more states than any of the nuclear security efforts address alone.

This humble 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 and the next step might be a nuclear one. Along with its potential huge physical, physiological and financial destruction, this would create a

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[458] Gören, "Re: Nukleer Terorizm Konulu Tez Hk."

new wave in 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 view as well as other states’ view 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 would make it easier to understand how even the smallest amount of radioactive materials could be used for malicious actions. These would both increase awareness of the threat and promote existing nuclear security efforts.

CONCLUSION

Terrorism still continues to be threat as it has always been. It evolves into new forms and its indiscriminative nature improves in every new form. And, nuclear terrorism might be the next step. Because, its potential rate of lethality 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 other two forms of nuclear terrorism would not cause huge destruction, psychological effects of sabotaging a nuclear facility or exploding a dirty bomb would be much more powerful on target audience than any other forms 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 a comprehensive attention in order to be more effective. At this point, current international responses to the threat of nuclear terrorism as well as nuclear security culture are at the stage of development. And, as a global threat to the global security, the threat of nuclear terrorism requires a global solution. However, current international responses to the threat of nuclear terrorism are unable to appeal to some states which either lack political willingness or are unware of the urgency of the threat. In addition, there is no mechanism that monitor implementation and compliance of the current international efforts. Within the light of these information the thesis aimed to answer the following research question:

How should the international nuclear security efforts be to more effectively cope with the threat of nuclear terrorism?

As an answer to the research question, the thesis suggested in the last part of the Chapter III that an international nuclear security regime with all pieces of an international regime and, developed norms and nuclear security culture would present more effective nuclear security efforts. Because, it would create and develop its norms and principles which would give sense of belonging and status to participating states. In return, these would sustain trust, continuity and stability during cooperation between states. In addition, the international nuclear nonproliferation regime offers a base for nuclear security regime with its already developed mechanisms. So, a nuclear security regime, inspired by the

international nuclear nonproliferation regime, would be more effective to cope with the threat of nuclear terrorism.

To answer the research question and sub-questions, the thesis evaluated both the international nuclear nonproliferation regime and nuclear security efforts as well as threat of nuclear terrorism.

For this point, Chapter I focused on presenting background information for both nuclear terrorism and international regimes. It started with the war which is a kind of violence but with rules to abide by. In other words, war as being a policy tool of state does not give full authority to state for applying violence. Instead, it brings limitation even when state wages war and during the war. Then, the chapter discussed the changing nature of war, adapting according to the conditions. However, this part showed that with new forms of war the distinction between combatants and non-combatants has become blurry, especially after the 9/11 attacks when asymmetric war attracted a renewed attention. Because, unlike conventional wars between states, non-state actors have started to become a side of the conflict.

After linking the chapter with non-state actors, this part started with the definitional discussion of terrorism as there is no universal definition of it. Then, it reviewed the evolution of terrorism mainly based on Rapoport's wave approach. This clearly showed the indiscriminative nature of terrorism which does not recognize any rules. Afterwards, nuclear terrorism and its brief historical background linked the chapter with nuclear security and nuclear security culture. This part defined nuclear terrorism and nuclear security and highlighted the importance of nuclear security against the threat of nuclear terrorism. The last part of the chapter reflected two of IR theories in accordance with their approach to the cooperation which constituted the ground for the Regime Theory. Also, this part offered characteristics of an international regime which helped the author answer the research question.

Chapter II presented the structure of the international nuclear nonproliferation regime and international nuclear security efforts. In the first part of the chapter, the thesis reviewed the components of the international nuclear nonproliferation regime. While doing the review of each component, this part showed strong and weak sides of this regime. In addition, this part presented current statuses of the components to have a better

understanding on this regime. Also, objectives of each component to enhance nuclear nonproliferation, peaceful use of nuclear energy and nuclear disarmament pillars of the regime were explained.

The second part of the chapter gave detailed information about international nuclear security efforts and reviewed each of the nuclear security components. This part showed how nuclear security norm has been developing accordingly to the situation in post 9/11 period. While reviewing the core of these responses, this part also reflected deficiencies of them. This aspect of the part actually explained the need for a more effective nuclear security. Thus, this part had an important role in shaping the research question.

In Chapter III, the thesis focused on the threat nuclear terrorism. The first part evaluated different terrorist groups who are more inclined to nuclear terrorism because of different incentives. The first section of this part focused on politico-religious groups including apocalyptic ones that dominate the last wave of terrorism. This section showed these terrorists are capable of doing anything to achieve their aims and thus, nuclear terrorism looks quite attractive for them. In addition, this section reviewed their incentives for nuclear terrorism as well as their capabilities and resources.

The next section focused on nationalist/separatist terrorist groups and reviewed their potential approach to nuclear terrorism. As a natural result of their nature, this section highlighted why these terrorist groups might only be interested in RDD and sabotaging nuclear facilities. In addition, the section showed their comparatively limited agenda and capabilities that might not lead these terrorist groups to resort to acquisition of nuclear weapon or IND.

In the last section of this part, single-issue terrorist groups were reviewed because of the importance of some extremists and anti-nuclear groups. The section illustrated their dedication to their issues and their importance in the nuclear terrorism equation. By highlighting their limited agenda and more limited resources, the section evaluated which acts of nuclear terrorism they might resort.

The next part of this chapter started with the acts of nuclear terrorism and was built on Ferguson and his colleagues' the *Four Faces of Nuclear Terrorism*. Acquisition of an intact nuclear weapon constituted the first act, which has relatively higher requirements

to be accomplished. Because, with the limited number of states that have or are believed to have nuclear weapons, pathway to the intact nuclear weapon is quite hard for most of the terrorist organizations. However, this part showed the existing weaknesses that terrorists might exploit to achieve their aims.

As a result of the difficulty to acquire an intact nuclear weapon, the next section detailed the possibility of construction of an IND by terrorists. Even though the conditions of acquiring HEU or plutonium is comparatively easier than acquiring an intact nuclear weapon, this section pointed out the technical hardships that terrorists need to overcome such as fabricating gun-type or implosion-type assembly methods. After detailing these hardships, this section ended with the statement which clearly illustrated the possibility of an IND attack.

The next section of this part focused on sabotage of a nuclear facility by which terrorist might try to cause release of radiation. As a natural result of 9/11 attacks, there has been some concerns regarding the possibility of a suicide attack with a plane to nuclear facilities. This section responded these concerns and illustrated the weaknesses. In addition to airplane suicidal crashes, this section also gave a full picture of possible attacks on nuclear facilities through different methods.

The last section of this part detailed the relatively easiest act of nuclear terrorism. By giving information about RDD, this section highlighted the weakness in obtaining radioactive materials for RDD. It further illustrated RDD's comparatively easier design and technical requirements. This section also highlighted the fact that as RDD attack is comparatively easier method of nuclear terrorism, its possible consequences are comparatively lower.

This part, in general, laid out possibility of each act and difficulty to accomplish that act. Also, this part underlined the psychological effects of acts of nuclear terrorism.

In the end of the chapter, the thesis proposed a suggestion for how international nuclear security efforts should be to more effectively cope with the threat of nuclear terrorism. Then, this section laid out the reasons for the proposal which is made according to the evaluation of former chapters.

In general, the aim is to be able to provide a framework in which nuclear security could be more effective by being inspired with the international nuclear nonproliferation regime. Because, even though there are international responses for prevention of nuclear terrorism, there are still some vulnerabilities that terrorists might easily exploit. Therefore, both material and non-material potential consequences of the treat should trigger a more comprehensive attention for international responses to the threat of nuclear terrorism which might be more effective with proposed approach before the world experience a “nuclear 9/11”.

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APPENDIX 1: Thesis Originality Report

HACETTEPE UNIVERSITY
GRADUATE SCHOOL OF SOCIAL SCIENCES
THESIS/DISSERTATION ORIGINALITY REPORT

HACETTEPE UNIVERSITY
GRADUATE SCHOOL OF SOCIAL SCIENCES
TO THE DEPARTMENT OF INTERNATIONAL RELATIONS

Date 28/06/2017

Thesis Title / Topic: Threat of Nuclear Terrorism: Towards an Effective Nuclear Security Regime

According to the originality report obtained by myself/my thesis advisor by using the Turnitin plagiarism detection software and by applying the filtering options stated below on 09/06/2017 for the total of 151 pages including the a) Title Page, b) Introduction, c) Main Chapters, and d) Conclusion sections of my thesis entitled as above, the similarity index of my thesis is 1 %.

Filtering options applied:

1. Approval and Decleration sections excluded
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I declare that I have carefully read Hacettepe University Graduate School of Social Sciences Guidelines for Obtaining and Using Thesis Originality Reports; that according to the maximum similarity index values specified in the Guidelines, my thesis does not include any form of plagiarism; that in any future detection of possible infringement of the regulations I accept all legal responsibility; and that all the information I have provided is correct to the best of my knowledge.

I respectfully submit this for approval.

28/06/17
Date and Signature

Name Surname: Muhammed Ali Alkış
Student No: N12234522
Department: International Relations
Program: International Relations
Status: ☒ Masters ☐ Ph.D. ☐ Integrated Ph.D.

ADVISOR APPROVAL

APPROVED.

Asst. Prof. Dr. Sebnem Udum
(Title, Name Surname, Signature)

APPENDIX 2: Tez Çalışması Orijinallik Raporu

HACETTEPE ÜNİVERSİTESİ
SOSYAL BİLİMLER ENSTİTÜSÜ
YÜKSEK LİSANS/DOKTORA TEZ ÇALIŞMASI ORJİNALLİK RAPORU

HACETTEPE ÜNİVERSİTESİ
SOSYAL BİLİMLER ENSTİTÜSÜ
ULUSLARARASI İLİŞKİLER ANABİLİM DALI BAŞKANLIĞI'NA

Tarih: 28/06/2017

Tez Başlığı / Konusu: Threat of Nuclear Terrorism: Towards an Effective Nuclear Security Regime

.....

Yukarıda başlığı/konusu gösterilen tez çalışmamın a) Kapak sayfası, b) Giriş, c) Ana bölümler ve d) Sonuç kısımlarından oluşan toplam 151 sayfalık kısmına ilişkin, 09/06/2017 tarihinde şahsım/tez danışmanım tarafından Turnitin adlı intihal tespit programından aşağıda belirtilen filtrelemeler uygulanarak alınmış olan orijinallik raporuna göre, tezimin benzerlik oranı % 1 'tür.

Uygulanan filtrelemeler:
1- Kabul/Onay ve Bildirim sayfaları hariç,
2- Kaynakça hariç
3- Alıntılar hariç/dâhil
4- 5 kelimeden daha az örtüşme içeren metin kısımları hariç

Hacettepe Üniversitesi Sosyal Bilimler Enstitüsü Tez Çalışması Orjinallik Raporu Alınması ve Kullanılması Uygulama Esasları'nı inceledim ve bu Uygulama Esasları'nda belirtilen azami benzerlik oranlarına göre tez çalışmamın herhangi bir intihal içermediğini; aksinin tespit edileceği muhtemel durumda doğabilecek her türlü hukuki sorumluluğu kabul ettiğimi ve yukarıda vermiş olduğum bilgilerin doğru olduğunu beyan ederim.

Gereğini saygılarımla arz ederim.

28/06/17
Tarih ve İmza

Adı Soyadı: Muhammed Ali Alkış
Öğrenci No: N12234522
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Programı: Uluslararası İlişkiler
Statüsü: ☒ Y.Lisans ☐ Doktora ☐ Bütünleşik Dr.

DANIŞMAN ONAYI

UYGUNDUR.

Yrd.Doç.Dr. Şebnem Udum
(Unvan, Ad Soyad, İmza)

APPENDIX 3: Ethics Board Waiver Form for Thesis Work

HACETTEPE UNIVERSITY
GRADUATE SCHOOL OF SOCIAL SCIENCES
ETHICS BOARD WAIVER FORM FOR THESIS WORK

HACETTEPE UNIVERSITY
GRADUATE SCHOOL OF SOCIAL SCIENCES
INTERNATIONAL RELATIONS TO THE DEPARTMENT PRESIDENCY

Date 28/06/2017

Thesis Title / Topic: Threat of Nuclear Terrorism: Towards an Effective Nuclear Security Regime

My thesis work related to the title/topic above:

1. Does not perform experimentation on animals or people.
2. Does not necessitate the use of biological material (blood, urine, biological fluids and samples, etc.).
3. Does not involve any interference of the body's integrity.
4. Is not based on observational and descriptive research (survey, measures/scales, data scanning, system-model development).

I declare, I have carefully read Hacettepe University's Ethics Regulations and the Commission's Guidelines, and in order to proceed with my thesis according to these regulations I do not have to get permission from the Ethics Board for anything; in any infringement of the regulations I accept all legal responsibility and I declare that all the information I have provided is true.

I respectfully submit this for approval.

28/06/17
Date and Signature

Name Surname: Muhammed Ali Alkış
Student No: N12234522
Department: International Relations
Program: International Relations
Status: ☒ Masters ☐ Ph.D. ☐ Integrated Ph.D.

ADVISER COMMENTS AND APPROVAL

Approved

Asst. Prof. Dr. Şebnem Udum
(Title, Name Surname, Signature)

APPENDIX 4: Etik Kurul İzin Muafiyeti Formu

HACETTEPE ÜNİVERSİTESİ
SOSYAL BİLİMLER ENSTİTÜSÜ
TEZ ÇALIŞMASI ETİK KURUL İZİN MUAFİYETİ FORMU

HACETTEPE ÜNİVERSİTESİ
SOSYAL BİLİMLER ENSTİTÜSÜ
ULUSLARARASI İLİŞKİLER ANABİLİM DALI BAŞKANLIĞI'NA

Tarih 28.06/2017

Tez Başlığı / Konusu: Threat of Nuclear Terrorism: Towards an Effective Nuclear Security Regime

Yukarıda başlığı/konusu gösterilen tez çalışmam:

1. İnsan ve hayvan üzerinde deney niteliği taşımamaktadır,
2. Biyolojik materyal (kan, idrar vb. biyolojik sıvılar ve numuneler) kullanılmasını gerektirmemektedir.
3. Beden bütünlüğüne müdahale içermemektedir.
4. Gözlemsel ve betimsel araştırma (anket, ölçek/skala çalışmaları, dosya taramaları, veri kaynakları taraması, sistem-model geliştirme çalışmaları) niteliğinde değildir.

Hacettepe Üniversitesi Etik Kurullar ve Komisyonlarının Yönergelerini inceledim ve bunlara göre tez çalışmamın yürütülebilmesi için herhangi bir Etik Kuruldan izin alınmasına gerek olmadığını; aksi durumda doğabilecek her türlü hukuki sorumluluğu kabul ettiğimi ve yukarıda vermiş olduğum bilgilerin doğru olduğunu beyan ederim.

Gereğini saygılarımla arz ederim.

Tarih ve İmza 28/06/17

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