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Seksan Anantasirikiat

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Foreword

This Study Paper, *Regional Institutions on Nuclear Energy in ASEAN: Design and Development*, is written by Seksan Anantasirikiat, an ISC's researcher, based on his own research. As the author clearly states in the paper, there are two main objectives. Firstly, it aims to narrow the gap in academic literature in the study of ASEAN's historical and institutional development by focusing on regional institutions on nuclear energy. Secondly, it also aims to expand the knowledge on international cooperation and nuclear energy by using ASEAN as a case study. Analysis is made of the three principal ASEAN mechanisms on nuclear energy: SEANWFZ, NEC-SSN, and ASEANTOM. The creation and institutional development of ASEANTOM is highlighted because of Thailand's proactive leadership.

Considering the need to fight against climate change, dwindling traditional sources of energy, and the increasingly vehement opposition to fossil fuel, some ASEAN member states may consider nuclear energy as an alternative. This means that the mechanisms, standards, and regulations related to non-proliferation, safety and security need to be properly and urgently addressed at the regional level.

The ISC hopes that the analysis in this paper would be useful in filling the gap on an issue which is rarely examined and wishes to express its appreciation to Seksan Anantasirikiat for his efforts in producing an interesting piece of research.

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Abstract

Although ASEAN has an impressive record of institutional development, the analysis about regional institutions on nuclear energy is rarely examined. The previous scholarship mainly focuses on the role and functions of SEANWFZ. While some studies shed light on the policies and energy demands of a specific ASEAN country, this study paper argues that ASEAN has been taking a Globalist approach on nuclear non-proliferation and energy issues, meaning the countries prefer regional mechanisms to promote peace and security and actively support the existing international regimes concerning nuclear weapon and energy issues. In ASEAN, there are three principal regional mechanisms on regional nuclear energy: SEANWFZ, NEC-SSN, and ASEANTOM. In case of ASEANTOM, there are three key factors determining institutional design and development. The three factors determining the creation and institutional development of ASEANTOM are (1) Thailand's proactive leadership, (2) global and regional norms, and (3) ASEAN member countries' preferences and capabilities.

Keywords: ASEANTOM, ASEAN, institutional design, nuclear energy, regional cooperation

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List of Abbreviations

ACE	ASEAN Centre for Energy
AMEM	ASEAN Ministers on Energy Meeting
ARF	ASEAN Regional Forum
ASEAN	Association of Southeast Asian Nations
ASEANTOM	ASEAN Network of Regulatory Bodies on Atomic Energy
ASTOP	Asian Senior-Level Talks on Non-Proliferation
CSA	Comprehensive Safeguards Agreement
CTBT	Comprehensive Nuclear Test Ban Treaty
IAEA	International Atomic Energy Agency
NEC-SSN	Nuclear Energy Cooperation Sub-Sector Network
NPT	Treaty on the Non-Proliferation of Nuclear Weapons
OAP	Office of Atoms for Peace (Thailand)
PSI	Proliferation Security Initiative
SEANWFZ	Southeast Asia Nuclear Weapon-Free Zone
SQP	Small Quantities Protocol
UNSC	United Nations Security Council
WMD	Weapons of Mass Destruction
ZOPFAN	Zone of Peace, Freedom, and Neutrality

1.
Introduction

ASEAN, as a regional grouping, has a long history of institutional development. Since its beginning in 1967, ASEAN has been evolving under the changing international environment. During the Cold War, ASEAN was successful in managing the external powers in order to maintain its neutrality and centrality. After the Cold War ended, ASEAN proceeded with fast-pacing development. For example, ASEAN expanded its member states to ten in 1997. Moreover, it played a vital role in bringing together dialogue partners to disseminate the future of the region at its forums, including APT and EAS. An important hallmark for the institutionalisation of ASEAN is the ratification of the ASEAN Charter and the leaders' efforts to establish the ASEAN Community by the end of 2015.

At the global level, almost all ASEAN countries ratified and acceded to the NPT during 1970s-1980s.[1] Moreover, most of them have been the parties of several global nuclear regimes, including the Comprehensive Safeguards Agreement, the Convention on Nuclear Safety, the Convention on

[1] Myanmar was the last ASEAN country to accede the NPT in 1992.

Early Notification of a Nuclear Accident, the Nuclear Terrorism Convention, and so on. They also submitted the reports following the requirements of the UNSC Resolution 1540, closing the opportunity for non-state actors to acquire any materials having potential for the weapons of mass destruction. At the regional level, all ASEAN countries ratified the SEANWFZ in Bangkok, the first and only regional treaty on nuclear issues, in 1995. Besides, the ASEAN leaders agreed to continue their commitments to maintain the region free of nuclear weapons and other weapons of mass destruction as clearly stated in the Article 1 (3) of the ASEAN Charter.[2]

At the national level, ASEAN countries have had records of nuclear energy-related activities since the 1960s. Four ASEAN countries consisting of Thailand, Viet Nam, the Philippines, and Indonesia, operated their nuclear research reactors.[3] Among these four countries, the Philippines was the only member having plan to construct a nuclear power plant. However, it had to prolong the plan twice due to concerns over nuclear safety and security after the Three Mile Island Nuclear Accident in 1979 and the Chernobyl Nuclear Accident in 1986.[4] As an immediate reaction to the Fukushima Nuclear Accident in 2011, ASEAN countries decided to prolong their plans to build nuclear power plants. They also determined setting up a regional mechanism on nuclear safeguards, safety, and security, also known as nuclear 3S, for the first time.

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[2] "Charter of the Association of Southeast Asian Nations," ASEAN Secretariat, accessed May 26, 2022, 3, https://asean.org/wp-content/uploads/images/archive/publications/ASEAN-Charter.pdf.

[3] Nur Azha Putra, "The dynamics of nuclear energy among ASEAN member states," *Energy Procedia* no. 143 (2017): 586-88. This list follows the chronology of the country who built the reactors first.

[4] Putra, "The dynamics of nuclear energy," 587.

To promote nuclear energy security, EAS countries agreed to cooperate "for the development and use of civilian nuclear power" by ensuring the nuclear 3S.[5] Following the ASEAN Declaration on Environmental Sustainability, ASEAN countries concurred on the establishment of "a regional nuclear safety regime" in order to reinforce a regional cooperation on information sharing, technical exchanges, and capacity building for peaceful use of nuclear technology, particularly for power generation purpose.[6] The AMEM corresponded to these visions by assigning the senior energy officials to work out the Terms of References and configuration of this regional entity.[7] The First and Special Meetings of the NEC-SSN took place in Singapore in January and May 2008. The process of negotiating and drafting the Term of References finally ended in 2011, which marked the First Annual Meeting of the NEC-SSN.

In the same year of the First Annual Meeting of the NEC-SSN, ASEAN discussed the idea of creating a regional entity to reinforce the 3S, following the Fukushima Nuclear Accident in March. The OAP, on the occasion of

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[5] "Singapore Declaration on Climate Change, Energy and the Environment," ASEAN Secretariat, November 21, 2007, https://asean.org/singapore-declaration-on-climate-change-energy-and-the-environment/.

[6] "ASEAN Declaration on Environmental Sustainability," ASEAN Secretariat, June 13, 2012, https://asean.org/asean-declaration-on-environmental-sustainability/; see also ACE, *Civilian Nuclear Energy: Factsheet* (Jakarta: ASEAN Centre for Energy, 2020).

[7] "Joint Ministerial Statement the 25th ASEAN Ministers on Energy Meeting (AMEM) "Energising ASEAN to Power a Dynamic Asia" Singapore, 23 August 2007," ASEAN Secretariat, August 23, 2007, https://asean.org/joint-ministerial-statement-of-the-twenty-fifth-asean-ministers-on-energy-meeting-energising-asean-to-power-a-dynamic-asia-singapore-23-august-2007/.

the golden jubilee of its foundation, arranged the international conference, aiming at assessing the situation of nuclear energy in ASEAN and collecting policy recommendations from other ASEAN countries. The senior officials drafted the concept paper in 2012. The Prime Minister of Thailand, at that time, proposed the idea to the 20th ASEAN Summit. Receiving positive responses from other member countries, the officials disseminated the Term of References for one year (2012-2013). The First Annual Meeting of ASEANTOM took place in 2013 with the main objective to formulate the work plan of the network.

The objectives of this study paper are two-folds. First, it narrows the gap in academic literature in the study of historical and institutional development in ASEAN by focusing on regional institutions on nuclear energy. It also aims to expand the knowledge on international cooperation and nuclear energy by providing an in-depth analysis of the case study of ASEAN. This study paper argues that the three factors determining the creation and institutional development of ASEANTOM are (1) Thailand's proactive leadership, (2) global and regional norms, and (3) ASEAN member countries' preferences and capabilities. It also complements the existing explanation offered by Dalpino and Westmeyer that ASEAN has been taking a Globalist approach on nuclear non-proliferation and energy issues, meaning ASEAN countries prefer regional mechanisms to promote peace and security and actively support the existing international regimes concerning nuclear weapon and energy issues.[8]

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[8] Catharin Dalpino and Timothy Westmeyer, "Southeast Asia: A Measured Nuclear Policy," in *Nuclear Debates in Asia: The Role of Geopolitics and Domestic Processes*, eds. Mike M. Mochizuki and Deepa M. Ollapally (Lanham: Rowman & Littlefield Publishers, 2016), 185-209

1.1 ASEAN in the study of nuclear governance

Roles and functions of SEANWFZ

A number of academic literatures on regional institutions on nuclear energy in ASEAN largely focus on the evolution, characteristics, and challenges of SEANWFZ. Seminal works on international cooperation and nuclear issues deem SEANWFZ a case study of regional nuclear weapon-free zones.[9] They briefly explained the evolution of the treaty, by which the previous two treaties, Tlatelolco and Rarotonga, inspired the establishment. SEANWFZ derived from the declaration of ZOPFAN in 1971, as an attempt to centralise its regional organisation among the competition of great powers in the region. Authors also referred to the fact that all NWS are still hanging on the ratification of the Treaty until the time of writing.[10] Given the fact that no NWS signed the Treaty, Graham justified SEANWFZ as a "failure".[11]

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[9] Susan Burk, "Nuclear Weapon-Free Zones," in *Routledge Handbook of Nuclear Proliferation and Policy*, eds. Joseph F. Pilat and Nathan E. Busch (New York: Routledge, 2015), 310-311; Joseph Cirincione, Jon B. Wolfsthal, and Miriam Rajkumar, *Deadly Arsenals: Nuclear, Biological, and Chemical Threats*, Second Edition (Washington D.C.: Carnegie Endowment for International Peace, 2005), 34; Michael Hamel-Green, "Nuclear-Weapon-Free Zone Developments in Asia: Problems and Prospects," *Global Change, Peace & Security* 17, no. 3 (2005): 240-242; Michael Hamel-Green, "Cooperation Regionally, Denuclearizing Globally: Multilateral Nuclear Weapon-Free-Zone Initiatives," in *International Cooperation on WMD Nonproliferation*, ed. Jeffrey W. Knopf (Georgia: University of Georgia Press, 2016), 206-228; Hong Thao Nguyen, "Asia-Pacific Moving towards the Ratification of the Treaty on the Prohibition of Nuclear Weapons," *East Asian Observer* 11 (2018): 465-475.

[10] Burk, "Nuclear Weapon-Free Zones," 311.

[11] Thomas Graham, Jr., *The Alternate Route: Nuclear-Weapon-Free Zones* (Corvallis, Oregon: Oregon State University Press, 2017), 104.

The second scheme indicates political and legal implications of the SEANWFZ Treaty. Acharya and Boutin reflected some concerns of the U.S. and China on the application of the Exclusive Economic Zones (EEZs). The U.S. expressed its anxiety over the limitations of its military presence in the region, while China's principal concern regarded its ability to exercise nuclear and military escalation should the country be a party of SEANWFZ.[12] Regarding the legal perspective of SEANWFZ, Kittichaisaree argued that the provisions under the Treaty, in accordance with TAC and 1982 UNCLOS could be constructive tools in managing the conflicts in the South China Sea. He also pointed out concerns addressed by NWS as key obstacles of the implementation.[13]

An additional sort of literature pays attention to the role of SEANWFZ in historical and institutional development of ASEAN. Acharya and Weatherbee saw SEANWFZ as a tiny step toward the establishment of a security community in the region.[14] Ba considered SEANWFZ a significant effort to strengthen the relevance of ASEAN to negotiate global and regional issues such as nuclear proliferation. The process of working together within and beyond the region to implement SEANWFZ stipulated the unique diplomatic style of ASEAN that could accommodate the interests of different actors. The Treaty is a symbol of the idea "One Southeast Asia" because it was the first treaty signed by all ASEAN member countries.[15]

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[12] Amitav Acharya and J. D. Kenneth Boutin, "The Southeast Asia Nuclear Weapon-Free Zone Treaty," *Security Dialogue* 29, no. 2 (1998): 220-224.

[13] Kriangsak Kittichaisaree, "A Code of Conduct for Human and Regional Security Around the South China Sea," *Ocean Development & International Law* 32, no. 2 (2001): 135-36.

[14] Amitav Acharya, *Constructing a Security Community in Southeast Asia: ASEAN and the Problem of Regional Order*, third edition (London, New York: Routledge, 2014), 171; Donald K. Weatherbee, *International Relations in Southeast Asia: The Struggle for Autonomy*, second edition (Lanham: Rowman & Littlefield Publishers, 2009), 105.

[15] Alice D. Ba, *(Re)Negotiating East and Southeast Asia: Region, Regionalism, and the Association of Southeast Asian Nations* (Stanford: Stanford University Press, 2009), 187-88.

A thorough analysis about the prelude to the signing of SEANWFZ is Bilveer Singh's.[16] His work investigated the attitude and policies of ASEAN countries toward nuclear proliferation and regional cooperation under the framework of SEANWFZ. Although his report went further in details, the conclusion is similar to the abovementioned literature. He stated that ASEAN countries had positive attitude toward the nuclear non-proliferation even if some countries intended to accelerate their nuclear capabilities. Besides, ASEAN countries possessed capabilities and position to compromise between NWS' interests and internal security distress such as the issues of Nuclear Security Assurances (NSAs) and the South China Sea.

Concerning the aftermaths of SEANWFZ, Abad's article analysed the strategic significance of SEANWFZ in the first decade after the ratification. He mapped out the new strategic environment in Southeast Asia by stating three aspects, including new dynamics of regionalism, increasing number of agreements to reduce nuclear arms race, external nuclear threats (the cases of India-Pakistan and North Korea), and international terrorism.[17] SEANWFZ is relevant to these changing strategic conditions, generally because it keeps member states in check for ensuring nuclear non-proliferation and disarmament. It also supports the confidence-building and cooperative activities in the region.[18]

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[16] Bilveer Singh, *ASEAN, the Southeast Asia Nuclear Weapon-Free Zone and the challenge of denuclearisation in Southeast Asia: problems and prospects*, Canberra papers on strategy and defence; no. 138 (Canberra: Australian National University, 2000).

[17] M C Abad Jr., "A Nuclear Weapon-Free Southeast Asia and its Continuing Strategic Significance," *Contemporary Southeast Asia* 27, no. 2 (2005): 171-72.

[18] Abad Jr., "A Nuclear Weapon-Free," 177-78.

Nuclear as a regional issue in ASEAN

Abad's work provides a linkage to another theme of academic literature on nuclear as a regional issue in ASEAN with the implications on non-traditional security issues. Ogilvie-White examined the connection between global non-proliferation and each member states' obligations in counter-terrorism, particularly the adoption of UNSC Resolution 1540. She argued that the perception gap between ASEAN-style and West-centric threatens the governance on nuclear non-proliferation in the region because global practices neglected the adaptation of local norms. Moreover, the success of ASEAN in enhancing confidence and regional cooperation had been rather bilateral and multilateral than regional one.[19]

Conversely, Malley reoriented the trend of the study on nuclear issues in ASEAN by questioning the possibility of nuclear proliferation in ASEAN as the study on the relationship between nuclear proliferation and regional security is underexplored. ASEAN countries had no incentives and capabilities to develop their nuclear weapons because there was no immediate threat to the region.[20] In his article, Malley explored two cases: Myanmar and Indonesia. For the case of Myanmar, the possibility of nuclear proliferation derived from increasing isolation and financial resources, and its proximity to North Korea. While the case of Indonesia was different as Indonesia is a country with profiles of compliance to international agreements and its intention for peaceful use of nuclear technology.[21]

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[19] Tanya Ogilvie-White, "Non-proliferation and Counter-terrorism Cooperation in Southeast Asia: Meeting Global Obligations through Regional Security Architectures?," *Contemporary Southeast Asia* 28, no. 1 (2006): 1-26.

[20] Michael S. Malley, "Prospects for Nuclear Proliferation in Southeast Asia, 2006-2016," *Nonproliferation Review* 13, no. 3 (2006): 606-7.

[21] Malley, "Prospects for Nuclear Proliferation," 610-12.

The third category of literature pays attention to nuclear and energy security. Symon indicated emerging energy challenges triggering the calculation of energy security in the region. Interestingly, nuclear energy was not new to the region as some countries had attempted to develop their nuclear capabilities for research and electricity during the 1960s. In his article, Symon introduced the country plans and proposals of five ASEAN countries, including Indonesia, Malaysia, the Philippines, Thailand, and Viet Nam. Apart from his analysis, he proposed the idea of "ASEAN Nuclear Energy Commission" as a policy initiative to maintain regional nuclear order. According to Symon, this mechanism is at best to be a broker dealing with nuclear plant dealers, who are mostly international companies, in order to ensure the compliance of ASEAN member states with international agreements.[22]

Nuclear energy has been a dominant topic in the study of regional nuclear order in ASEAN. Several articles in the series "Asia's Energy Trends and Developments" contributed to the progress of nuclear energy development in ASEAN with a special focus on individual country. Radiman unveiled an ambition of the Malaysian government to attain "nuclear power status" and set up its nuclear power plants by 2021.[23] While Prasetijo stressed on a necessary electricity demand that would lead Indonesia to perform with large scale power plants. He also discuss the development of Indonesia's nuclear industry and its readiness of infrastructure for the assessment by the IAEA.[24]

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[22] Andrew Symon, "Southeast Asia's Nuclear Power Thrust: Putting ASEAN's Effectiveness to the Test?," *Contemporary Southeast Asia* 30, no. 1 (2008): 133.

[23] Shahidan Radiman, "Malaysian Perspectives, Planning and Problems with Regard to Nuclear Energy," in *Asia's Energy Trends and Developments Volume 1: Innovations and Alternative Energy Supplies*, eds. Mark Hong and Amy Lugg (Singapore: World Scientific, 2013), 205-213.

[24] Djoko Prasetijo, "Power Development Plan and Status of Nuclear Power Plant (NPP) Development in Indonesia," in *Asia's Energy Trends and Developments Volume 1: Innovations and Alternative Energy Supplies*, eds. Mark Hong and Amy Lugg (Singapore: World Scientific, 2013), 179-192.

Dalpino and Westmeyer's is a recent work providing a comprehensive review of each country's stance toward nuclear issues (except Viet Nam). The authors explored the motivations of ASEAN countries to acquire nuclear energy. They argued that ASEAN countries had continuously been taking "Globalist" approach.[25] According to them, there are three main drivers behind the path toward regional nuclear security in ASEAN. First of all, ASEAN countries put forth energy security as their priorities. Second, many ASEAN statements referred "the need for clean energy" as their efforts to tackle the climate change enigma. The last factor is historical. ASEAN experienced the intervention of external powers during the colonial and Cold War periods. Therefore, the acquisition of nuclear was related to the national survival and prestige. If ASEAN countries were successful in dealing with those powers, ASEAN would not move toward a robust regional nuclear energy and non-proliferation mechanism. The article also considered domestic civil society as an important determinant of the procrastination of nuclear energy development within the region.[26]

Regional institutions on nuclear energy in ASEAN

The previous two categories reflect academic trends at the time of their writings. According to my personal observation, the first generation (1990s-2000s) of literature analysed the autonomy of ASEAN to resist the external influence as well as positive contribution of the regional norms in maintaining the harmony within the region through SEANWFZ. The following generation (2005-2008) paid more attention to the relationship between ASEAN regional arrangements and individual ASEAN country on counter-terrorism and energy security. The third generation (2008 afterwards) weighed domestic processes as the key component to the development of regional nuclear order in ASEAN. However, they rarely mention about nuclear energy within the region.

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25 Ibid.

26 Ibid.

In this sub-section, the author identifies the key components of regional institutions on nuclear energy in ASEAN. Delfin proposed three key drivers behind ASEAN countries' decisions to go for nuclear energy: energy concerns, environmental concerns, and ASEAN's participation in global regimes on nuclear issues. He also outlined a timeline for institutional development of NEC-SSN with further discussion on its challenges, particularly its intertwining functions with the IAEA and the willingness of ASEAN countries to promulgate regional standards.[27]

Caballero-Anthony and Trajano suggested that ASEAN countries should take into consideration serious issues such as regulatory frameworks on nuclear safety, emergency planning, and physical protection. At the end of the article, they proposed policy recommendations to foster regional cooperative actions through ASEAN mechanisms, including NEC-SSN and ASEANTOM.[28] However, these works did not analyse the key factors or sources that influenced the creation of regional institutions on nuclear energy in ASEAN.

ASEANTOM appeared in the chapter on Southeast Asia in Wan's work, which examines regional pathways toward nuclear non-proliferation and regime around the world. Generally, this book challenges the existing

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[27] Francisco G. Delfin, Jr., "Birthing ASEAN Nuclear Energy Cooperation Regime: Drivers, Status and Way Forward," in *Asia's Energy Trends and Developments Volume 1: Innovations and Alternative Energy Supplies*, eds. Mark Hong and Amy Lugg (Singapore: World Scientific, 2013), 237-249.

[28] Mely Caballero-Anthony and Julius Cesar I. Trajano, "Enhancing nuclear energy cooperation in ASEAN: Regional norms and challenges," in *Learning from Fukushima: Nuclear Power in East Asia*, eds. Peter Van Ness and Mel Gurtov (Canberra: Australian National University Press, 2017); Mely Caballero-Anthony and Julius Cesar I. Trajano, "Examining Southeast Asia's Diplomacy on Nuclear Armament and Nuclear Security: Shared Norms and Regional Agenda", *Asian Journal of Peacebuilding* 10, No. 2 (2022): 1-25.

academic works on international cooperation and nuclear non-proliferation by using region as a unit of analysis. Wan explored linkages between all existing regional nuclear weapon-free zones and regional organisations, including Africa, Western Europe, Latin America, Middle East, Northeast Asia, South Asia, and Southeast Asia. His key argument is: these regional mechanisms positively contributed to the global disarmament and non-proliferation efforts. They could play a role to supplement the coherence and robustness of the global NPT.[29]

For the case of Southeast Asia, Wan pointed out that regional nuclear order in ASEAN is based on SEANWFZ. However, it is not a single source for nuclear non-proliferation in the region. He also stated the security environment that had been free of direct nuclear threats as well as the attempts of ASEAN member countries to institutionalise regional mechanisms since the signing of ASEAN Declaration in 1967. New regionalism focusing on economic cooperation reoriented the policy priority of ASEAN to economic cooperation. Although some countries have plans to develop nuclear technology for securing its energy security, this will not form the path toward nuclear weapons. Wan also stressed on the ASEAN-style political and economic regionalism as an important factor to maintain regional harmony on policy actions.[30]

Regarding the ASEANTOM, Wan deemed it "the most significant form of regional nuclear cooperation within Southeast Asia since the Bangkok Treaty (SEANWFZ Treaty – author)" given its different characteristic from

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[29] Wilfred Wan, *Regional Pathways to Nuclear Nonproliferation* (Athens: University of Georgia Press, 2018), 3.

[30] Wan, "Regional Pathways," 78-89.

other ASEAN regional platforms by determining a clear specific action plan with more than twenty activities. Wan realised great potentials for institutional development of the ASEANTOM due to ASEAN's regional focus on security and economic development as well as ASEAN Way of dealing with external and internal stakeholders. The process of ASEAN Community-building offered a conducive environment for ASEAN countries to move forward.[31]

This study paper acknowledges a significant contribution of Wan's book to the study of international cooperation on nuclear non-proliferation and nuclear 3S by applying region as a unit of analysis. However, the author has two additional points building on Wan's work. First, ASEAN-style political and economic regionalism specifies correlation rather than association to the development of regional nuclear order. Wan is correct to address the role of regional platforms such as ARF, ASEAN Defence Ministers' Meeting (ADMM) with realisation of challenges they are facing. However, these platforms do not automatically contribute to the development of regional nuclear order. This research suggests that not only "existing mechanisms" but also "political process" matter in the determination of institutional pathways. It also shed light on the contribution of other sources as independent variables shaping design of regional institutions on nuclear energy in ASEAN.

Secondly, ASEAN is an inter-governmental organisation, as clearly stated in Article 3 of the ASEAN Charter.[32] Article 20 of the ASEAN Charter also underlines that any decisions that bind all countries will be proceeded by the principle of consultation and consensus. It means that there will be no regional progress without the willingness of member states. If a member

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[31] Wan, "Regional Pathways," 91-92.

[32] "Charter of the Association of Southeast Asian Nations," 8.

state disagrees, the whole process will be prolonged until it reaches agreement. This principle has been seriously applicable to the international relations among ASEAN countries. Thus, member states' positions or preferences toward a single issue is relevant to the analysis determining region as a variable or a unit of analysis.

1.2 Analytical framework

Building on the critique on Wan's analysis, the author's main research question is: *why and how did ASEAN countries create the ASEANTOM?* To explain the political process of constructing the ASEANTOM in details, the author borrows four specific questions from Knopf.[33] First of all, who were the initiators or leaders to propose the idea of cooperation and why? Second, how had the activities become a function of the cooperation? Lastly, why did the ASEANTOM evolve in this way?

This study takes on exploratory case studies as its main method due to three reasons. First, the study of the nuclear-related issues in ASEAN needs more exploration. Second, there is lack of research. Lastly, this exploratory study enhances new insights on the topic. Hymans called for theoretical building and testing by "using systematic process-tracing" that explores through the "detailed case studies".[34] On methodology, Yin underlines five

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[33] Jeffrey W. Knopf, "International Cooperation on Nonproliferation: The Growth and Diversity of Cooperative Efforts," in *International Cooperation on WMD Nonproliferation*, ed. Jeffrey W. Knopf (Georgia: University of Georgia Press, 2016), 12.

[34] Jacques E. C. Hymans, "The Study of Nuclear Proliferation and Non-proliferation: Toward a New Consensus?," in *Forecasting Nuclear Proliferation in the 21st Century: Volume 1 The Role of Theory*, ed. William Potter (Stanford: Stanford University Press, 2010), 35-37.

essential components for case studies comprising research questions, unit of analysis, propositions the logical linkage between propositions and data, and the interpretation of findings.[35] The following paragraphs elaborate on how this work follows Yin's approach.

This research, therefore, explores the formulation of regional institutions on nuclear energy in ASEAN, particularly the ASEANTOM. To do so, it analyses the international environment and national concerns of all ten ASEAN member countries, including their policies, plans, leader's speeches. This work, however, does not aim to compare each country's stance toward the global regimes and initiatives. The author realises the unequal proportionality of data as not all ASEAN countries are parties to all existing international agreements and regimes. Also, only some countries had played leading role in reaffirming the creation of regional institutions on nuclear energy in ASEAN.

Main sources of this research are from academic articles, ASEAN documents, website on the international organisations related to nuclear 3S, and online news. This work will also employ the interviews with the policy makers who are relevant to the political processes that led to the establishment of the ASEANTOM in order to gain depth and roundedness of understanding rather than the knowledge at the surface. The author also uses his experiences when he was the project assistant for a project to create a regional energy market from 2013-2014 as a reference to depict an image of energy politics in the region. As a result, this research aims to generate inductive richness of data to complement the existing explanations.

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[35] Robert K. Yin, *Case Study Research and Applications: Design and Methods*, sixth edition (Thousand Oaks: SAGE, 2018).

To answer the questions, the author formulates his own analytical framework from the variables used in the previous scholarship. This framework consists of three key components to explain the creation of the ASEANTOM. The first component is leadership. It focuses on the role of leading countries who had actively engaged in the formation of the regional institution by proposing ideas, providing platforms, managing the conflicts and cooperation at the initial stage of the cooperation.

The previous scholarship touched upon this factor but in different ways. Knopf proposed leadership as a factor to probe stages of cooperation by underlining the role of the U.S. as hegemonic power in the world system.[36] Acharya and Johnston also called for the reflection of the most powerful state's interests through institutional design. They called it "systemic and sub-systemic power distributions".[37] Referring to these perspectives, leadership is a relevant factor to inspect the creation of ASEANTOM. It is not always the case that most powerful state is the one who proposed the idea to the region.

The second component refers to the role of ideas and norms discussed at the existing international and regional institutions. These institutions facilitate the flow of ideas and learning process. In this case, the existing institutions mean global regimes on nuclear non-proliferation and 3S such as IAEA as well as the regional institutions such as the EAS, ARF, ASEAN Summit, AMEM, informal meetings, and transnational networks. These

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[36] Knopf, "International Cooperation on Nonproliferation," 13.

[37] Amitav Acharya and Alastair Iain Johnston, "Comparing regional institutions: an introduction," in *Crafting Cooperation: Regional International Institutions in Comparative Perspective*, eds. Amitav Acharya and Alastair Iain Johnston (Cambridge: Cambridge University Press, 2007), 19.

institutions are essential to embrace new thoughts and set the agenda that might influence the interests or preferences of member states.

Several articles highlight the importance of ideational factors. For example, Knopf underlined norms and identity as "potentially relevant" factor for international cooperation on nuclear issues.[38] He assumed that the role of ideas and norms through social learning and transnational networks might influence the international cooperation on nuclear issues.[39] Acharya and Johnston reviewed loopholes in the previous literature by pointing out the underrepresentation of non-Western countries in the study of regionalism. They abandoned non-material components such as norms and ideas in contributing to institutional design.[40] The scholarship also concerned shared norms, values, beliefs, and cognitive models as factor.[41] Similarly, Wan deemed these ideational factors positively contributed to the formation of regional nuclear order. He employed shared understanding of nuclear threat, beliefs, shared values, and interests as a basis for his comparative study, and considered the presence of security and economic institutions at the regional level.[42]

The final component is member states' *a priori* preferences and capabilities, referring to the capabilities ASEAN countries possessed or planned to acquire in order to enhance their energy security and nuclear safety before participating in the ASEANTOM. This research investigates

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[38] Ibid.

[39] Knopf, "International Cooperation on Nonproliferation," 14.

[40] Acharya and Johnston, "Comparing regional institutions," 11, 13.

[41] Acharya and Johnston, "Comparing regional institutions," 16-18.

[42] Wan, "Regional Pathways," 39.

capacity to produce nuclear power, balance between sources for energy supplies and electricity demand, and existing nuclear regulatory bodies at the time of joining the regional institution.[43] The examination of these items also help explain the disproportionate role of each country in the regional institutions on nuclear energy.

Capabilities are one among seven factors Knopf created to explain the international cooperation on nuclear non-proliferation. According to Knopf,

capabilities are feasible determining factor for the state to cooperate or not cooperate in any regimes on nuclear non-proliferation. The state might have in mind their plans to acquire technology or technical support from joining the club.[44] As a result, this research considers these capabilities as sources of the creation of the ASEANTOM.

[43] The author gains some insights from Pasit Somboonpakron, "Nuclear Energy in Southeast Asia: Pull Rods or Scram," (Master's Thesis, Naval Postgraduate School, USA, 2009).

[44] Knopf, "International Cooperation on Nonproliferation," 15.

2.
Regional Institutional Development of Nuclear Energy in ASEAN

2.1 The establishment of SEANWFZ (1995)

ASEAN has a history of nuclear development since the 1960s. According to Putra, Thailand was the first country to begin its nuclear research reactor, the so-called the TRR-1 in 1962. Viet Nam was second in ASEAN to start a research reactor under the provision of the Da Lat Nuclear Research Reactor (DNRR) in March 1963. This reactor's capability was improved from 250 kW to 500 kW by 1982. The Philippines followed this trend by operating a nuclear research reactor, the so-called PRR-1, in August 1963. The reactor was later upgraded for technical and training purposes. The fourth was Indonesia. It generated the first research reactor, TRIGA Mark III, with small capacity and expanded in 1979. The fifth was Malaysia. Its research reactor was first operated in 1982. There was no record of nuclear development in the rest of ASEAN during the Cold War.[45]

At the same period, there appeared global efforts to reinforce the norms of nuclear non-proliferation via the NPT. This treaty was signed in March 1970. A key aftermath, according to Singh, was a global division of a

[45] Putra, "The dynamics of nuclear energy," 585-589.

"nuclear bipolarity" between the "nuclear haves" and the "nuclear have-nots". Although there was a negative view of the have-nots seeing this treaty as "an incomplete and unequal treaty document", the cooperation has been maintained in several ways, including safeguards and inspection activities, the control of nuclear export, the adoption of agreements and pledges at both regional and national level.[46] Fortunately, the world had a chance to witness the concurrence on the Treaty of Tlatelolco in Latin America. This treaty positively contributed to the NPT regime. It was the first time the foundation of nuclear weapon-free zone as a complementary approach was agreed.

However, there were four criticisms on the aspect of the NPT regime related to the situation in the developing countries at that time. First of all, non-proliferation was mutually exclusive from the alliance system in the world politics. Second issue was about the "discriminatory" practice in its structure and application. Third, the NPT did not address the problem of vertical proliferation sufficiently.[47] Finally, the NPT itself did not treat non-nuclear weapon states to acquire civilian benefits as literally stated.[48] Adding to that, the non-aligned countries called for the elimination of nuclear testing by NWS. There were also problems with the cases of Iraq and North Korea displaying the violation while being members of the treaty. The issue of discrimination was a big debate at that time.[49]

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[46] Singh, "ASEAN, the Southeast Asia Nuclear Weapon-Free Zone," 1.

[47] This concept refers to the efforts by nation-states to accelerate their nuclear capabilities domestically. While the concept of horizontal proliferation denotes the efforts by nation-states or non-state actors that do not currently possess, to acquire nuclear capabilities.

[48] Singh, "ASEAN, the Southeast Asia Nuclear Weapon-Free Zone," 7-8.

[49] Singh, "ASEAN, the Southeast Asia Nuclear Weapon-Free Zone," 9.

In the ASEAN region, there was a regional effort to set up the SEANWFZ following several successful cases around the world such as the issuance of the Declaration on the De-nuclearisation of Africa at Lusaka Meeting in 1964 and the 29th UNGA resolutions on nuclear weapon-free zones in the Middle East and South Asia. SEANWFZ was also acknowledged following the success in concluding the Treaty of Tlatelolco in 1967 and the Treaty of Rarotonga in 1985.[50] To accomplish the conclusion of SEANWFZ, there was a comment that ASEAN should work to clarify some aspects consisting of the persuasion to the Philippines to withdraw the U.S. military bases, the invitation of Malaysia to ensure its nuclear relations with UK, the inducement to Australia to relinquish its nuclear strategy in the Indian Ocean that might conflict with the U.S. policy, the enforcement of Indonesia to disavow its nuclear option, and the warrant of New Zealand's continuing path toward non-proliferation.[51]

There were two ASEAN countries who were very active in pushing the agenda of SEANWFZ at the ASEAN Summits: Indonesia and Malaysia. President Suharto delivered his speech to proceed with the idea of nuclear weapon-free zone in the region, although ASEAN could not solve the Cambodian Conflict. According to Singh, this effort was a part of Indonesia's faithfulness to be an independent and active actor in the international arena.[52] While Malaysia proposed to link the concept of nuclear weapon-free zone to ZOPFAN, also known as the Kuala Lumpur Declaration of 1971.[53]

[50] Singh, "ASEAN, the Southeast Asia Nuclear Weapon-Free Zone," 24.

[51] Singh, "ASEAN, the Southeast Asia Nuclear Weapon-Free Zone," 26.

[52] Singh, "ASEAN, the Southeast Asia Nuclear Weapon-Free Zone," 32.

[53] In the declaration, the parties publicly stated their intent to keep South East Asia "[f]ree from any form or manner of interference by outside powers" and "broaden the areas of cooperation".

However, it was not easy to reach the consensus on the adoption of ZOPFAN due to two reasons. First issue was related to the signing of nuclear weapon states. Some thought that the treaty was meaningless without their signatures. Second, it was difficult to deal with "geographical limitations" given the situation at that time. The membership of ASEAN had not reached the present ten countries. Some expressed their concern over regional domination by a specific country.[54] There was a distress that this nuclear weapon-free zone would benefit the Soviet Union due to its military presence in its allies' territories. This circumstance would inevitably bring the U.S. to balance the Soviet Union. Then, ASEAN could not totally avoid the great power politics.[55]

After a decade, the ASEAN member states finally signed the Treaty at the 5th ASEAN Summit in December 1995. The signing itself reflected three key characteristics of changing geopolitical landscape: (1) the end of the Cold War (2) the expansion of ASEAN membership to ten and (3) the peaceful solution of all regional conflicts at that time, particularly the Cambodian Conflict. The document comprises 13 pages and 22 articles. The Treaty entered into force in 1997 after the seventh signatory, Viet Nam, acceded and ratified. Singh indicated several advantages of the SEANWFZ Treaty as (1) the reinforcement of ASEAN countries' commitment to nuclear non-proliferation (2) the formation of "a regional verification system to ensure compliance with SEANWFZ" (3) the prioritisation of consultation in the dispute settlement and (4) a platform for further socialisation cuing a positive sign to the neighbouring areas.[56]

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[54] Singh, "ASEAN, the Southeast Asia Nuclear Weapon-Free Zone," 33.

[55] Ibid.

[56] Singh, "ASEAN, the Southeast Asia Nuclear Weapon-Free Zone," 37.

Although the SEANWFZ Treaty was signed by all ASEAN countries, a more-than-decade disagreement between ASEAN countries and NWS existed. The U.S. objected to signing this Treaty due to its dissatisfaction over the coverage of sensitive areas, including continental shelves and EEZs. It found the provision "too restrictive" for the rights of passage and "too sweeping and unprecedented" for nuclear restraints. Territorial issue was also problematic for China. It expressed support for general idea of the Treaty, except the application to the disputed areas of the Spratlys. For France, President Jacques Chirac pointed out that the country might rethink some details. While Russia required some "clarification on how the Treaty will be implemented", particularly the passage of ships.[57]

2.2 Regional path toward nuclear energy in ASEAN and the formation of NEC-SSN (2008)

After the SEANWFZ Treaty entered into force in 1997, there were four critical developments for the establishment of regional institutions on nuclear security in ASEAN. First, the misunderstandings between nuclear weapon states and ASEAN countries due to ASEAN efforts to compromise between their interests and nuclear weapon states' concerns. Second, ASEAN countries could find a way to deal with U.S. worry over NSAs by citing the evolving international view on the necessity of "an interim regime" while moving toward the full implementation of the treaty. Third, China was the first country to express its intention to accede to the SEANWFZ Treaty due to ASEAN's ability to accommodate the fear of China over the disputed

[57] Acharya and Boutin, "The Southeast Asia Nuclear Weapon-Free Zone Treaty," 225, 227; Muthiah Alagappa, "A nuclear-weapons-free zone in Southeast Asia: Problems and prospects," *Australian Journal of International Affairs* 41, no. 3 (1987): 178-179.

territory. This is a breakthrough for a foggy atmosphere at that time. Finally, the Foreign Ministers concurred on the establishment of the SEANWFZ Commission to represent ASEAN in contacting the officials from NWS. This Commission set up the Executive Committee to prepare necessary documents, monitor the compliance, and interact with the IAEA.[58]

Moreover, ASEAN tried to push its treaty to be recognised by the international community. There were three legal and technical issues: its accordance with the NPT, the status of consultations with nuclear weapon states, and the drafting of the rules of procedures. ASEAN countries had to discuss on the decision-making under the Treaty, whether it should be majority or consensus. Another question was on the participation, who could be on the Executive Committee.[59] Opening the space for nuclear weapon states' signature, ASEAN has proceeded the SEANWFZ Treaty with the similar status as when it was enforced in 1997. After the signing of the SEANWFZ Treaty in 1995, there are three regional statements that are relevant to the institutional development of nuclear issues in ASEAN. These statements comprise the ARF Statement on Non-Proliferation (2004) and ARF Statement Supporting the Implementation of UNSC Resolution 1540 (2007), ASEAN Convention on Counter-Terrorism (2007), and Singapore Declaration on Climate Change, Energy, and Environment (2007).

The first two documents were issued following to the global regimes on nuclear non-proliferation at that time. There were several global initiatives to promote nuclear non-proliferation, including the NPT Review Conferences and the CTBT. The NPT pinpointed the global efforts to promote

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[58] Singh, "ASEAN, the Southeast Asia Nuclear Weapon-Free Zone," 51-52.

[59] Singh, "ASEAN, the Southeast Asia Nuclear Weapon-Free Zone," 52-53.

international cooperation on nuclear non-proliferation and peaceful use of nuclear technology. It also aims to move forward the global disarmament. The NPT is the only international treaty that legally binds nuclear weapon states.[60] Additionally, the parties agreed to arrange the reviewing conferences every five years. The main objective of these conferences is to evaluate the implementation of its provisions and disseminate further measures or recommendations.

At the 2000 NPT Review Conference, the parties reached the agreementon adopting the final document, evaluating the past performances and the key issues related to the three core principles of NPT, non-proliferation, disarmament, and peaceful use of nuclear technology. Moreover, there were issues on the legal status of the past agreements reached at the 1995 and 2000 Conferences. Apart from the two NPT Review Conferences, there was an additional global effort on nuclear non-proliferation. In 1996, the UNGA adopted the CTBT. The main objective of this treaty is to fully prohibit any nuclear weapon test explosions in both military and civilian ways. It also stresses the commitment of the parties to proceed with any actions that would cause, encourage, and participate in nuclear weapon explosion. This treaty sets up mechanisms to monitor nuclear-related activities and provisions of punishment in case of any violations.[61]

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[60] "Review Conference of the Parties of the Treaty on the Non-Proliferation of Nuclear Weapons (NPT)," United Nations, accessed May 26, 2022, https://www.un.org/en/conf/npt/2015/.

[61] "Comprehensive Nuclear-Test-Ban Treaty (CTBT): History of the Treaty," United Nations Office of Disarmament Affairs, accessed May 26, 2022, https://www.un.org/disarmament/wmd/nuclear/ctbt/.

The UNSC unanimously adopted the Resolution 1540 in April 2004. This resolution reaffirms the principle of nuclear non-proliferation by considering any state's effort to acquire nuclear, chemical, and biological weapons and any modalities of delivery "a threat to international peace and security".[62] It also prohibits the state to receive any support from non-state actors to strengthen the abovementioned activities. Principally, this resolution insists on its binding obligations. All states have to implement national legislations to foster the nuclear non-proliferation activities. It also requires the states to prevent the illicit trafficking by enforcing appropriate measures to control related materials domestically. Besides, this resolution promotes international cooperation on nuclear non-proliferation and full implementation of the states.[63]

Regional efforts to promote nuclear non-proliferation was acknowledgedby the ARF Statement on Nuclear Non-Proliferation in 2004. It was the first time ASEAN and other main players, particularly nuclear weapon states, jointly declared their position toward the issue. The participants would take necessary measures to implement the existing agreements on nuclear non-proliferation comprising effective export controls, review their abilities to control radioactive sources, and political commitment to follow the guidance. It is also referred to in the statement that ARF participants strongly supported the UNSC Resolution 1540. They also expressed their commitment to a successful 2005 NPT Review Conference.

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[62] "1540 Factsheet," 1540 Committee, accessed May 26, 2022, https://www.un.org/en/sc/1540/1540-fact-sheet.shtml.

[63] Ibid.

On the origins of the ASEAN Convention on Counter-Terrorism, ASEAN leaders expressed their intention on anti-terrorism since 1997. They adopted the Declaration on Transnational Crime in 1997 followed by the Action Plan in 1999. Following the 9/11 terrorist attacks, ASEAN adopted the 2001 ASEAN Declaration on Joint Action to Counter Terrorism in November 2001 in order to join hand with the global efforts to prevent terrorism by improving collaborations at all levels. Apart from the 9/11 terrorist attacks, there were two events directly related to nuclear security and terrorism: Abdul Qadeer (A.Q.) Khan Network and North Korea issue. A. Q. Khan is a Pakistani scientist, who played an essential role in establishing a network running commercial exchange of nuclear technology and equipment in the black market such as Iran, North Korea, Libya, and so on. The network was very strong given its wide connections with businessmen in over 20 countries. It gained a lot of money by offering a wide range of products and prices.[64] The importance of this issue revealed that non-state actors could be a player in selling illicit products and conducting illegal activities related to nuclear weapons.

ASEAN also addressed and expressed its concern over regional nuclear threats such as the case of North Korea. At the ARF meetings, ASEAN reiterated its support to peaceful process on the Korean Peninsula. North Korea withdrew from the NPT in 2003 responding to President George W. Bush's address criticising North Korea as an "Axis of Evil" as well as the revelation on North Korea's secret activities that could violate the 1994 agreement. In the same year, the Six-Party Talks, a multilateral effort to solve the nuclear issue in North Korea, took place. There had been six principal rounds with several phases of talks among six countries in Northeast Asia (China, Japan, North

[64] Molly MacCalman, "A. Q. Khan Nuclear Smuggling Network," *Journal of Strategic Security* 9, No. 1 (2016): 104.

Korea, South Korea, Russia, and the United States). During the negotiation process, there were deals made between North Korea and other parties. For example, North Korea pledged to "freeze" its program if the other parties promised to provide economic assistance.[65]

ASEAN Leaders viewed terrorism as a profound threat to international peace and security and "a direct challenge to the attainment of peace, progress and prosperity of ASEAN and the realisation of ASEAN Vision 2020". They expressed commitment to combat terrorism in accordance with the UN Charter, international laws and relevant UN resolutions. They also stated that "cooperative efforts in this regard should consider joint practical counter-terrorism measures in line with specific circumstances in the region and in each member country".[66] However, the 2001 ASEAN Declaration on Joint Action to Counter Terrorism did not mention any measures to prevent nuclear terrorism or any illicit activities prohibited by global regimes and mechanisms on nuclear non-proliferation. The 2007 ASEAN Convention on Counter Terrorism (ACCT) is the first and only ASEAN convention to prevent nuclear terrorism in ASEAN. Referring to the International Convention for the Suppression Acts of Nuclear Terrorism (ICSANT) and the Convention on the Physical Protection of Nuclear Material (CPPNM), this convention acceded to these global regimes by defining the legal term of "offences" following to them.[67]

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[65] Pádraig Collins, "War games: a timeline of North Korea's nuclear weapons development," *The Guardian*, March 9, 2018, https://www.theguardian.com/world/2016/jan/06/north-korea-nuclear-weapons-development-timeline; Kelsey Davenport, "The Six-Party Talks at a Glance," Arms Control Association, last modified January 2022, https://www.armscontrol.org/factsheets/6partytalks.

[66] Ibid.

[67] "ASEAN Convention on Counter Terrorism," ASEAN Secretariat, accessed May 26, 2022,

Another regional statement is the ASEAN Declaration on Environmental Sustainability. The issue of sustainability had in place been a key global aspiration the UN members intended to attain since the UN Conference on Environment and Development in Rio de Janeiro in 1992 and the 2000 UN Millennium Summit, which set the Millennium Development Goals (MDGs). The global effort to promote sustainable development continued on the World Summit on Sustainable Development (WSSD). The key outcome of the WSSD was the confirmation of the concept of sustainable development, connecting poverty, environment, and management of natural resources. The meeting also stressed on strategic role of partnerships in the development process.[68] In addition to these global platforms, ASEAN expressed its commitment to the UN Framework Convention on Climate Change (UNFCCC) in order to fight against the climate change.

ASEAN issued this Declaration to reiterate its strong support to sustainable development in the region. A key point of the declaration related to nuclear issue is ASEAN leaders' obligation to "forge ASEAN-wide cooperation to establish a regional nuclear safety regime".[69] At the 25th AMEM Meeting, the ministers noted the efforts to create a regional institution on nuclear energy and called for report of the progress in the following AMEM in 2008. With the recognition of increasing oil prices, the ministers stated an urgent need to take actions. One of their solutions was "civilian nuclear energy". While accentuating a possibility for nuclear energy,

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https://asean.org/wp-content/uploads/2012/05/ACCT.pdf.

[68] Susan R. Fletcher, *World Summit on Sustainable Development (WSSD): Background and Summary*, updated October 25, 2002, https://www.everycrsreport.com/files/20021025_RL31385_25882fd749490d8817ff1ff2b570b33b95423d98.pdf, CRS-9.

[69] ASEAN Secretariat, "ASEAN Declaration on Environmental Sustainability,".

the ministers addressed their recognition with the principle of nuclear non-proliferation, safety, and security. They recommended the advancement of regional cooperation to promote clean energy and effective measures for carbon reduction.[70]

Singapore and Malaysia played a key role in developing regional institution on nuclear energy. Singapore arranged three special meetings in January, May, and October 2008. While Malaysia proposed a revised draft of Term of References (ToR) of this regional institution. At first, the institution was named the Nuclear Energy Safety Sub-Sector Network (NES-SSN). Its main objective was to explore a regional cooperation on nuclear energy for electricity. However, this scope was widened to public education, capacity building, and information sharing by the 26th AMEM Meeting.[71] The name NES-SSN was changed to the NEC-SSN after various discussions. This name was formally acknowledged at the AMEM 27th AMEM Meeting in Mandalay.[72] This sub-sector network operated under the purview of the ACE and the energy ministries of the ASEAN member states.

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[70] "Joint Ministerial Statement of the 25th ASEAN Ministers on Energy (AMEM) Meeting".

[71] "Joint Ministerial Statement of the 26th ASEAN Ministers on Energy (AMEM) Meeting "ASEAN Cooperation to Strengthen Energy Security" Bangkok, 7 August 2008," ASEAN Secretariat, August 7, 2008, https://asean.org/joint-ministerial-statement-of-the-twenty-sixth-asean-ministers-on-energy-meeting-asean-cooperation-to-strengthen-energy-security-bangkok-thailand-7-august-2008/.

[72] "Joint Ministerial Statement of the 27th ASEAN Ministers on Energy (AMEM) Meeting "Securing ASEAN's Energy Future Towards Prosperity and Sustainability" Mandalay, Myanmar, 29 July 2009," ASEAN Secretariat, July 29, 2009, https://asean.org/joint-ministerial-statement-of-the-27th-asean-ministers-on-energy-meeting-amem-mandalay-myanmar-29-july-2009/.

2.3 ASEAN and its participation in other regional mechanisms on nuclear issues

ASEAN countries have been active participants to the transnational networks on nuclear non-proliferation, safety, and security such as ASTOP, Asian Network for Education in Nuclear Technology (ANENT), Asian Nuclear Safety Network (ANSN), and so on. The first three are regional platforms for regional senior officials to disseminate the situation and exchange their views on global nuclear non-proliferation and disarmament. From the author's observation after reading through the key discussions at ASTOP Meetings, it is likely that ASTOP has been playing an essential role as a platform for policymakers to share their concerns and set the agendas. The participants of ASTOP are from all ASEAN countries, plus some countries from the Asia-Pacific.

According to Table 1, one topic that had been stressed the most was the assessment of the regional nuclear threats, particularly North Korea's and Iran's. Apart from this, there had been exchanges of ideas on how the IAEA and its additional protocol is important as well as technical issues on the implementation of the existing international agreements on nuclear non-proliferation.

Table 1 Key discussions at the ASTOP Meetings 2003-2008[73]

Year	Key discussions
1st ASTOP (November 2003)	- The ongoing efforts to prevent nuclear terrorism and WMD - The denuclearisation of the Korean Peninsula - The need to further develop national institutions - The need to foster the cooperation on export control following the 1st Asian Export Control Policy Dialogue and the 11th Asian Export Control Seminar - The support of technical assistance to those who require
2nd ASTOP (February 2005)	- The review of the trends on illegal nuclear activities, including North Korea's nuclear threats and the illicit activities of A.Q. Khan Network - The measures to raise awareness on non-proliferation to reinforce the existing regimes such as IAEA - The need to enhance understanding to the adoption of treaties and norms that member states might encounter

[73] Compiled by the author from "Asian Senior-level Talks on Non-Proliferation (ASTOP)," Ministry of Foreign Affairs, Japan, last modified March 18, 2022, https://www.mofa.go.jp/policy/un/disarmament/arms/psi/index.html.

3rd ASTOP (February 2006)	- The review of the trends on illegal nuclear activities, including North Korea's and Iran's nuclear development - The measures to raise awareness on non-proliferation to reinforce the existing regimes such as IAEA and PSI - The acceleration of member states' awareness on the implementation of the UNSC Resolution 1540 - The need to enhance understanding to the adoption of treaties and norms that member states might encounter
4th ASTOP (February 2007)	- The recognition of IAEA Additional Protocol as the most realistic and effective measure to nuclear non-proliferation - The emphasis on North Korea's and Iran's nuclear threats - The mutual understanding on Assurance of Nuclear Fuel Supply - The emphasis on nuclear security as a counter-measure to nuclear terrorism - The difficulties in implementing the export control measures - The vitality of PSI
5th ASTOP (May 2008)	- The emphasis on North Korea's and Iran's nuclear threats - The sharing of the opinions on the implementation of UNSC Resolutions, export control system, and IAEA additional protocol - The outcomes of Japan's PSI Maritime Interdiction Exercise "Pacific Shield 07"

6th ASTOP (December 2009)	- North Korea's and Iran's nuclear threats and the implementation of UNSC Resolutions - Peaceful uses of nuclear technology, including IAEA additional protocol - Nuclear security and PSI

While ANENT plays an important role as a direct platform for the IAEA. It complements the existing programs by focusing on capacity building based on thematic issues. The membership of ANENT has increased over time. Most of them are from the Asia-Pacific. There are five ASEAN countries joining the club since 2004: Indonesia, Malaysia, the Philippines, Thailand, and Viet Nam. Malaysia, Viet Nam, and Indonesia were once the host of the committee meetings. This function is similar to ANSN. ANSN is a platform facilitates regional collaboration and national capacity building. All ASEAN members are in this network. Its characteristics aligned with the ASEAN style of regional management. This platform also formed "topical groups" to share information and experiences, principally on nuclear safety issues such as regulatory infrastructure, emergency preparedness, and radioactive waste management.

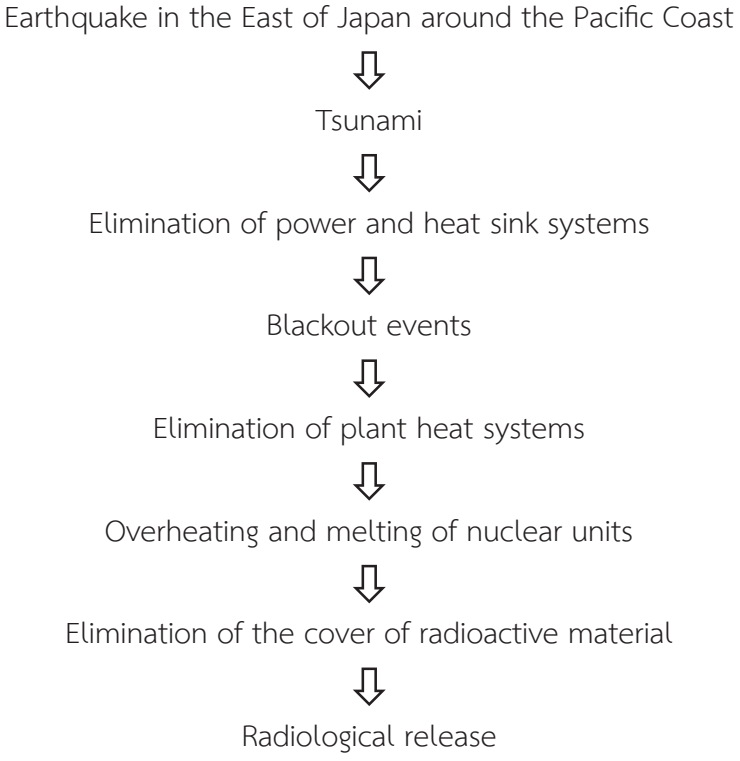
ASEAN was active participant in several regional stages such as ASTOP, ANENT, and ANSN. The presence of ASEAN countries in these platforms displayed its continuous commitment to promoting the principle of non-proliferation, disarmament, and peaceful use of nuclear technology. In addition to SEANWFZ, ASEAN leaders concluded the establishment of a sub-regional network to promote regional cooperation on nuclear energy under the supervision of the AMEM with focus on exchange and training. These regional frameworks and institutions have maintained the momentum of institutionalising the supervision of nuclear energy in the region.

3.
ASEANTOM: Institutional Design and Development

3.1 Fukushima Nuclear Accident in 2011

The Fukushima Nuclear Accident in 2011 is the third gigantic nuclear accident after the Three Mile Island Nuclear Accident in 1979 and the Chernobyl Nuclear Accident in 1986. According to the report on the facts of the incident by the IAEA, the first step of this accident derived from the earthquake in the East of Japan, around the Pacific Coast. The earthquake caused the tsunami, which destroyed the power systems, apparatus, and heat sink systems of the Fukushima Daiichi Nuclear Power Plant. Then, the power plant lost its ability to produce electricity because its main mechanisms were not in workable condition. There were several blackout events in the area after the flooding. The blackout shattered the plant heat system, resulting in the overheating and melting of the nuclear units. The melting of the nuclear units wrecked the reactor cores, which comprised radioactive material. Figure 1 outlines the core sequence of the accident.

Figure 1 Core sequence of the Fukushima Nuclear Accident in 2011



This circumstance was the most undesirable because radiation would be uncovered. It could trigger socio-economic impacts to the public. First of all, the surrounding areas had to be evacuated. Second, consuming food and drinking water from the area was prohibited due to a concern over the radiological contamination. Third, there was an announcement of emergency to stabilise the conditions, many people could not survive normally.[74] The

[74] Ibid.

international community responded to this incident at many stages. For example, the Fifth Review Meeting of the Contracting Parties to the Convention on Nuclear Safety, one month after the incident, concurred on the arrangement of the meeting to review and disseminate the aftermath of the incident and the potency of the Convention. The Extraordinary Meeting of the Contracting Parties to the Convention on Nuclear Safety scrutinised the international context and national conditions on-site and off-site. It also reviewed some concrete actions to advance transparency and effectiveness by launching a working group to reinforce further actions and proposals concerning nuclear safety under the Convention. Some of these ideas were to improve boldness in reviewing process as well as to generate national reports and periodic evaluations with reference to the IAEA safety standards.[75]

There were additional two meetings to follow-up the critical assessment of the Convention and the accident. One was the Sixth Review Meeting in April 2014. A main topic of the meeting was to hear the progress on the implementation of nuclear safety measures discussed in the Fifth Meeting. There were a number of improvements on emergency preparedness and nuclear safety arrangements. Besides, there were ongoing progress such as the creation of national safety frameworks, the attempts to initiate regulatory bodies, the expansion of international cooperation, and so on. After the Sixth Review Meeting, the IAEA convened the Diplomatic Conference and the Vienna Declaration on Nuclear Safety in February 2015. The contracting parties of the IAEA agreed on the three principles on the prevention of accidents with radiological results. First, they determined more restricted allowance of new nuclear power plants by emphasising the need to converge with the prevention measures. Second, they required regular and

[75] IAEA, *The Fukushima Daiichi Accident*, 195-196.

periodical evaluations on nuclear safety of the existing mechanisms. Third, they encouraged the adaptation of national requirements and regulations to the IAEA standards and good practices.[76]

At the regional level, ASEAN expressed "sympathy and solidarity with Japan over the incident" in the ASEAN Leaders' Statement at the 18th ASEAN Summit in Indonesia. In the section on regional cooperation on nuclear safety, ASEAN expressed its full support to accede to the IAEA standards of nuclear safety and security. Moreover, the leaders acknowledged the need to advance "a coordinated ASEAN approach" by working together with the IAEA and other partners.[77] The AMEM's Statement followed the ideas referred to in the Chair's Statement. It also noted some required actions such as information sharing, the formation of "a coordinated approach", regional nuclear emergency preparedness, and the reinforcement of the IAEA standards. They assigned the senior officials to initiate a relevant program collaborating with the IAEA to uphold the principle of nuclear safety and security in the region.[78]

At the national level, the 2011 Fukushima Nuclear Accident influenced the postponement of the building of nuclear power plants in many countries. Three countries, namely Malaysia, the Philippines, and Thailand had to delay the plan immediately. Malaysia announced its plan to build two nuclear

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[76] IAEA, *The Fukushima Daiichi Accident*, 196-197.

[77] "Chair's Statement of the 18th ASEAN Summit Jakarta 7-8 May 2011 "ASEAN Community in a Global Community of Nations"," ASEAN Secretariat, accessed May 26, 2022, https://asean.org/wp-content/uploads/2021/09/Statement_18th_ASEAN_Summit.pdf.

[78] "Joint Ministerial Statement of the 29th ASEAN Ministers on Energy Meeting (AMEM)," ASEAN Secretariat, accessed May 26, 2022, https://asean.org/wp-content/uploads/2021/08/Joint-Ministerial-Statement-of-the-29th-ASEAN-Ministers-on-Energy-Meeting-AMEM.pdf.

power plants in 1990. After the incident, the government suspended the plan but still made an attempt by conducting a feasibility study with reports.[79] For the Philippines, they had had a long dream to build a nuclear power plant since 1976. However, the nuclear accidents of Three Mile Islands and Chernobyl influenced the decision. This trend was similar in case of the Fukushima Nuclear Accident. In case of Thailand, the government halted the plan and extended the possible date to build a nuclear power plant to 2023. When the Ministry of Energy attempted to resume the plan in 2012, it encountered a sharp criticism from the public.[80]

In case of Indonesia, the incident did not affect the government's decision as much as the three countries because the country's elites favored to pursue nuclear energy. However, the government was not successful as they faced strong resistance from the civil society organisations. Their key argument was that Indonesia would not be capable of coping with the problems of nuclear safety. The civil society mentioned several disasters such as the tsunami in Sumatra in 2004, a mud-volcano eruption in East Java in 2006, and an earthquake in Yogyakarta in 2006.[81] In Viet Nam, nuclear safety was one of the key issues for building its nuclear power plant.[82] The elites of Myanmar also preferred possessing nuclear energy capability. According to the former minister of science and technology, having nuclear research was a sign of "a modern nation". However, there appeared no

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[79] Dalpino and Westmeyer, "Southeast Asia," 189.

[80] Dalpino and Westmeyer, "Southeast Asia," 191.

[81] Dalpino and Westmeyer, "Southeast Asia," 199.

[82] Linda J. Yarr and Nguyễn Thị Thanh Thủy, "Vietnam: Nuclear Ambitions and Domestic Dynamics," in *Nuclear Debates in Asia: The Role of Geopolitics and Domestic Processes*, eds. Mike M. Mochizuki and Deepa M. Ollapally (Lanham: Rowman & Littlefield Publishers, 2016), 166.

nuclear activities and no statements linked to the incident. While Singapore once underscored the importance of nuclear for its survival, it changed the plan after considering a report saying that this idea did not match with the size of the country.[83]

There is no concrete evidence for the rest of ASEAN countries, including Brunei Darussalam, Cambodia, and Lao PDR, indicating any motivations to acquire nuclear energy whether there was the Fukushima Nuclear Accident or not. These countries only had some activities related to nuclear issues. For example, Laos defended the superiority of national sovereignty over the decision to pursue nuclear energy, although it did not aim to acquire one. For Cambodia, the country realised the importance of nuclear energy but it required more time to study the possibility and impacts. In case of Brunei Darussalam, it had general exchanges with the IAEA but the scope of discussion concerned health and agriculture.[84] As a result, the Fukushima Nuclear Accident in 2011 shaped the governments' decisions on nuclear energy in different ways depending on several factors, including the countries' preferences, capabilities, and energy demand. An immediate impact of the incident toward regional institutional development of nuclear energy in ASEAN was awareness of the member states on nuclear safety and security. In the author's opinion, the Fukushima Accident was a critical push factor for the creation of ASEANTOM.

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[83] Dalpino and Westmeyer, "Southeast Asia," 190.

[84] Dalpino and Westmeyer, "Southeast Asia," 188.

3.2 Identifying sources of institutional design

Leadership

This sub-section explains the role of leadership in facilitating the establishment of ASEANTOM, a regional institution on nuclear energy in ASEAN. The author found that Thailand was the key advocate of this regional project. Thailand has played a constructive role in the process of ASEAN Community-building since its inception in 1967. Thanat Khoman, Minister of Foreign Affairs at that time, invited foreign ministers of Indonesia, Malaysia, the Philippines, and Singapore to come to Thailand and discuss the future of Southeast Asia. An informal discussion took place in a very informal atmosphere in Chon Buri Province, a very famous seaside town. On 8 August 1967, they signed the Bangkok Declaration, which is the establishing document of the ASEAN as a regional organisation.

In addition to the founding role, Thailand has been proactive in promoting institutional development of the ASEAN Community on several occasions. For example, Prime Minister Anand Panyarachun proposed the idea of the ASEAN Free Trade Area (AFTA) to the region in 1991. The key point of AFTA is to reduce tariff barriers to 0-5% within fifteen years. This initiative changed the regional dynamics from political to economic orientation. The ASEAN Charter, which is the constitution of all ASEAN members, entered into force in December 2008, the first three months of Thailand's ASEAN Chairmanship at that time. During its chairmanship, ASEAN leaders endorsed the Cha Am-Hua Hin Declaration on the Roadmap for the ASEAN Community. The ASEAN Community has become a principal foreign policy agenda of Thailand. As Surin Pitsuwan, Former ASEAN Secretary-General, underlined in

his speech, "ASEAN is Thailand's intellectual legacy. It will provide a ground for the country's global competitiveness".[85]

Thailand had prepared for the advent of the ASEAN Community. When the National Economic and Social Development Board (NESDB), which is the policy planning organisation at the national level, released the Eleventh National Economic and Social Development Plan (2012-2016), it stated the necessity for Thailand to engage ASEAN in several issues. Firstly, Thailand realised the economic importance of ASEAN as "a new economic center". The plan encouraged related stakeholders to proceed the multilateral free trade agreements negotiations. Second, the plan called for "more proactive" role in the community-building process by complying "with its commitments under various cooperative frameworks". Thirdly, the plan determined some policy priorities such as international cultural cooperation, infrastructure, and food and energy security. More importantly, the plan stressed the advancement of Thailand's role in international environmental frameworks and mechanisms.[86]

With a clear national direction related to the ASEAN Community, the executives of the OAP deemed this national direction as an opportunity to

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[85] Surin Pitsuwan's speech on the occasion of the opening of the ASEAN Studies Center, Chulalongkorn University 24 February 2012. See ASEAN Studies Center, Chulalongkorn University, "Chulalongkorn Mahawittayalai Kab Kan Trīam Khwām Phrǭm Sū Prachākhom Āsīan [Chulalongkorn University and the Preparation for the ASEAN Community]," in *Dr. Surin @ Chula: A Tribute to H.E. Dr. Surin Pitsuwan, Former Secretary-General of ASEAN*, https://www.car.chula.ac.th/upload/Dr.Surin-at-Chula-as-of-25-07-61-edited.pdf, 31.

[86] "Summary of the Eleventh National Economic and Social Development Plan (2012-2016)," National Economic and Social Development Board, Thailand, accessed May 26, 2022, https://www.nesdc.go.th/nesdb_en/ewt_w3c/ewt_dl_link.php?nid=4165.

come up with an initiative.[87] The Office played a leading role in developing a framework for all regulatory bodies on nuclear in ASEAN. In celebration of the fiftieth anniversary of its establishment, the executives decided to propose the concept of a regional institution to enhance Thailand's role in the ASEAN Community. On September 1-2, 2011, the OAP invited the representatives from all ASEAN members to meet at the International Conference on Safety, Security and Safeguards in Nuclear Energy in Bangkok. The Thai representative proposed the idea, which was positively welcomed by all national representatives. They agreed on the principle to establish "a network or an institution" to engage all regulatory bodies together under the framework of ASEAN.

To guarantee successful formation of this network, the OAP set up a working group with fourteen people from related government organisations, including Ministry of Foreign Affairs (MFA) (Department of International Organizations and Department of ASEAN Affairs), Ministry of Science and Technology (Office of International Cooperation), Ministry of Energy (Office of Nuclear Study and Cooperation), National Science Technology and Innovation Policy Office, and nine officers from the OAP. The group concurred on the coordination to push this agenda forward. They agreed to promote this initiative at the related regional meetings. There had been six meetings since the formation of the working group.

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[87] The author would like to express his appreciation to an executive at the OAP for sharing very useful information and guidance that provides a comprehensive view of ideas and processes led to the formation of the network. The following paragraphs are re-written from OAP, "Kan Damnnœ̄nkan Čhadtang Khrŭakhai Khwām Plodphai Thāng Niwkhlīa Læ Rangsī Nai Āsīan [The Establishment of the ASEAN Network of Regulatory Bodies on Atomic Energy (ASEANTOM)]," [Unpublished Manuscript].

The representative from the Ministry of Science and Technology introduced this idea to the 62nd ASEAN Committee on Science and Technology (ASEAN-COST) in November 2011. The representative from the MFA proposed the concept paper to the Senior Officials' Meeting (SOM) in March 2012 and the ASEAN Summit in April in the same year. At the meeting, the Prime Minister of Thailand proposed the idea to the Plenary Session. The consequence of this effort is the Chairman's Statement. It stated that ASEAN leaders accept the idea to "develop a network" of "nuclear regulatory bodies" in the region. The statement also outlined three features of this network: (1) exchange information and experiences (2) promote cooperation (3) improve capabilities on nuclear 3S.[88]

With positive responses from the aforementioned regional meetings, the working group decided to push this initiative as an ASEAN sectoral body under the ASEAN Political-Security Community (APSC). The OAP in collaboration with the MFA co-drafted the Term of Reference (ToR) of this network. Then, they invited twelve representatives from the nine ASEAN embassies in Bangkok to consider the draft of ToR at the Ad Hoc Meeting on the ASEANTOM in August 2012. After that, the OAP circulated this ToR to all regulatory bodies in ASEAN twice. Two countries, namely Indonesia and the Philippines, gave feedbacks to the working group. Then, the working group finalised the preliminary draft of ToR. The process required an assistance from the Thai MFA to circulate the document to all member states for formal approval.

[88] "Chairman's Statement of the 20th ASEAN Summit," ASEAN Secretariat, accessed May 26, 2022, https://asean.org/wp-content/uploads/2021/09/FINAL-Chairman-Statement 1330.pdf.

Apart from the process of asking for approval from member countries, Thailand called for international support from other institutions and actors outside the region. First of all, Thailand expressed its intention to reinforce the establishment of the ASEANTOM at the 55th General Conference of IAEA in September 2011. One year later, five ASEAN member countries, Indonesia, Malaysia, the Philippines, Singapore, and Viet Nam, supported the establishment of the ASEANTOM in their statements at the 56th General Conference in Vienna. Second, the Prime Minister of Thailand announced the country's desire to introduce the ASEANTOM at the 2012 Nuclear Security Summit in Seoul on 26-27 March, 2012. Lastly, Thai Minister of Science and Technology took similar action at the Fukushima Ministerial Conference in December 2012.

At the First Meeting of the ASEANTOM in September 2013, the representatives formally endorsed the ToR. There were several issues discussed at the meeting such as the Plan of Actions (PoA) of the network for the year 2014-2016, the identification of common interests and best practices, and the capacity-building of the member countries on 3S. The representatives concurred on the priorities of the network, including nuclear emergency preparedness, nuclear forensics, measures on anti-nuclear terrorism, and illicit export-import of nuclear materials. One week later, the SOM in Brunei Darussalam also formally endorsed the ToR. The Second Meeting of the ASEANTOM was held in Chiang Mai in August 2014. This meeting also acknowledged technical meeting on environmental radiation monitoring in ASEAN in its agenda.

Two key agendas discussed at the Second Meeting consisted of the management of the ASEANTOM and the formation of a network on

environmental issues under the ASEANTOM. The meeting recognised the status of the ASEANTOM as a sectoral body under the APSC. The Chair of the network follows the rotating ASEAN Chairmanship. For the year 2015, Malaysia accepted to take lead in convening the annual meeting. Following this, the OAP in collaboration with the MFA informed the member countries as well as the ASEAN Secretariat on the decision of the Second Meeting of the ASEANTOM. On environmental issues, the meeting concluded to form a new network so-called the "ASEANTOM Environmental Radiation Monitoring Network" in order to examine the amount of radiation in the region. The meeting also assigned the OAP to work on the related documents and processes as well as to seek support from the international organisations such as the IAEA, the European Commission (EC), the United States Department of Energy (U.S. DOE), and so on.

To maintain the momentum of the network, the OAP has contributed its own financial resources as noted in its operation plans since 2014. Main activities under these plans cover (1) meetings of the working groups (2) annual meeting of the ASEANTOM (3) training programs for the other regulatory bodies in the region (4) coordination with related stakeholders and circulation of the minutes of the meetings to relevant bodies such as the MFA. The expected outcomes as referred to in all plans are to "enhance Thailand's leadership on peaceful use of nuclear technology". They also mention the leadership in knowledge transfer on nuclear 3S.[89] Table 3 offers information on the OAP's budget for the operations of the ASEANTOM. Main objectives are (1) to support the annual meeting of the ASEANTOM and (2) to improve technical and personal capacity of ASEAN personnel. Although there

[89] OAP, *Phǣn Patibat Ratchakān Pracham Pī 2557-2561 [Annual Operation Plans 2014-2018]*, accessed May 26, 2022, http://www.oap.go.th/about-us/policy.

is a tendency of decreasing the amount of budget, it is still high compared to other national projects in Thailand.

Table 2 OAP's budget for the operations of the ASEANTOM[90]

Year	Amount (approximately in US Dollar)*	Objectives
2014	108,510	- ASEANTOM Annual meeting - Technical workshops for ASEAN personnel
2015	85,360	- Meetings with national liaison officers and project counter parts - Technical workshops for ASEAN personnel
2016	47,260	- Meetings of the working groups, academic networking events - International cooperation with regulatory bodies on 3S - Hosting of the ASEAN environmental network meeting
2017	47,255	- Hosting of the ASEAN environmental network meeting - Academic cooperation with the IAEA - ASEANTOM annual meeting
2018	35,680	- ASEANTOM annual meeting - Regional workshops

* This amount is calculated by the currency converter created by OANDA Corporation from the exchange rate of Thai baht (THB) to US Dollar (USD) on May 26, 2022.

[90] Ibid.

The OAP also provides its own financial support for establishing the ASEAN Environmental Radiation Monitoring Center and the ASEAN Environmental Radiation Data Center following the conclusion of the ASEANTOM annual meeting in 2014. Expected amount of budget for the whole project is 1,188,040 US Dollar from 2016 to 2018.[91] The establishment of these two centers is significant to the readiness for the building of nuclear power plant by any member states in the future. Member countries realise that any nuclear emergency or disaster could alter the whole region. They also recalled the case of Chernobyl Accident and the Fukushima Accident as possible worst-case scenarios.[92] All of these actions are sufficient to conclude that Thailand's leadership has been vital to the establishment and development of the ASEANTOM.

Global and regional norms

This sub-section explores the consequences of global and regional norms on the establishment and development of the ASEANTOM in three ways. First of all, the author agrees with Dalpino and Westmeyer's argument that ASEAN countries had been moving toward the Globalist view on the nuclear issues in the areas of non-proliferation and energy. The Globalist view here refers to the shift of the country acceding to the existing global agreements and mechanisms as well as to be an active member those regimes. ASEAN had committed to several global platforms a long time ago, even before the Fukushima Nuclear Accident in 2011. Most of ASEAN

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[91] OAP, *Phæn Patibat Ratchakān Pračham Pī 2559 [Annual Operation Plan 2016]*, accessed May 26, 2022, https://www.oap.go.th/images/documents/about-us/policy/sp2559.pdf, 68.

[92] OAP, *Phaen Patibat Ratchakan*, 51-52.

countries endorsed principal global treaties and agreements, including NPT and CTBT during the Cold War. These treaties lay the groundwork for their members to reinforce nuclear non-proliferation, nuclear disarmament, peaceful use of nuclear technology, and totally ban the test of nuclear weapons.[93]

All ASEAN countries have been the parties of the IAEA since the 1960s-1970s. Cambodia and Laos became members in 2009 and 2011 respectively while Brunei is the last to join in 2014. According to Article 2 and 3 of the Statute, the IAEA was established to expand the peaceful use of atomic energy, particularly for health and prosperity. The Statute also noted the prohibition of any uses for military purpose. Its main functions are to ensure correct purpose of nuclear use by managing safeguards, promote research activities and exchange of information and personnel in related areas, cooperate with the UN specialised agencies, and so on.[94] Complementing to the membership, ASEAN countries have committed to many provisions on nuclear 3S under the IAEA, including the Comprehensive Safeguards Agreement (CSA), the Small Quantities Protocol (SQP), and the Convention on Early Notification of a Nuclear Accident. Table 3 outlines the global commitment of ASEAN countries by the time of establishing the ASEANTOM.

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[93] Dalpino and Westmeyer, "Southeast Asia," 138-139.

[94] "The Statute of the IAEA," IAEA, accessed May 26, 2022, https://www.iaea.org/about/statute#a1-3.

Table 3 ASEAN commitment to the global nuclear non-proliferation and disarmament regimes by the time of the establishment of the ASEANTOM[95]

Countries/ Platforms	NPT	IAEA mem-bership	CTBT	CSA	SQP	Convention on Early Notification of a Nuclear Accident
Brunei Darussalam	✓			✓	✓	
Cambodia	✓	✓	✓	✓	✓	✓
Indonesia	✓	✓	✓	✓		✓
Lao PDR	✓	✓	✓	✓	✓	
Malaysia	✓	✓	✓	✓		✓
Myanmar	✓	✓	✓	✓	✓	✓
The Philippines	✓	✓	✓	✓		✓
Singapore	✓	✓	✓	✓	✓	✓
Thailand	✓	✓	✓	✓		✓
Viet Nam	✓	✓	✓	✓		✓

Second, although ASEAN had been moving toward the Globalist perspective on nuclear energy, its direction is also framed by collective regional norms, particularly the concept of 4Cs[96] and the concept of "ASEAN Way". The author agrees with Wan's analysis that economic regionalism and ASEAN identity had played an essential role in determining the characters of regional nuclear order and institutions. These factors would define the

[95] Adapted from Dalpino and Westmeyer, "Southeast Asia," 202-203.

[96] 4Cs comprise Community, Connectivity, Centrality, and Charter.

scope of nuclear issues to be discussed in the region and its modalities on how to work together to address and solve the problems. ASEAN's focus on economic regionalism reoriented its interest from hard security to softer cooperative issues. At the same time, ASEAN had been seeking its greater role in East Asian and Asia-Pacific region such as the APT and the Asia-Pacific Economic Cooperation (APEC).[97]

However, this aspiration for greater status enmeshed ASEAN in the politics of great powers competition. As Wan pointed out, the struggle between the two superpowers framed the nuclear issues in ASEAN to safety and security. Also, ASEAN countries would prefer to talk about "regional cooperation" on civilian use of nuclear energy rather than strong sense of nuclear "governance" within and beyond the region. Wan further explained the nuclear issues in ASEAN by indicating that the basic ideas of regional cooperation in ASEAN were based on the conclusion and a remaining challenge of SEANWFZ, which is the endorsement of nuclear weapon states. However, SEANWFZ itself was not a complete functioning regional organisation as it lacks "the unassembled or partly assembled forms" and the secretariat. The emphasis of national sovereignty also undermined the provision of the zone in practice.[98]

At the first stage of the establishment of the ASEANTOM, the concept of ASEAN Community and Connectivity played a very important role. First of all, the awareness of the ASEAN Community provided a conducive environment for further cooperation on any issues. Thailand grasped the opportunity to propose this idea to the region right after the Fukushima

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[97] Wan, *Regional Pathways*, 87-88.

[98] Wan, *Regional Pathways*, 89.

Nuclear Accident. According to the author's informal discussion with an executive of the OAP, the context of ASEAN Community accounted as a key push factor for successful establishment. The two key documents, the establishment of the ASEANTOM and the Annual Operation Plans, also stressed this idea as well as the ASEAN Connectivity. The official also shared that the realisation of inter-governmental characteristic decided the form of this institution to be a "network" rather than an "organisation" or a "supranational governance" like the EURATOM in Europe. Wan also shared similar argument that the context of ASEAN Community was relevant.[99]

On the concept of ASEAN centrality, Emmers pointed out that the concept had evolved over time with different emphasis. During the Cold War, the ASEAN centrality was mainly about ASEAN autonomy in managing the external relations with superpowers. After the Cold War, the concept evolved into the "impartiality in multipolar structure". The security environment in the Post-Cold War period has changed with the rise of China in terms of military and economic power. ASEAN has been attempting to develop an ASEAN-led regional architecture since the late 1990s. Although there was a conflict between great powers in the region, it would not negatively hit ASEAN as it had some experiences in the past. The way ASEAN applied this concept to their practice was rather from its desire not to choose any side in the conflict.[100] It seems that the application of ASEAN centrality in the case of ASEANTOM is likely to be based on autonomy within and beyond. The ASEANTOM has bestowed the authority to represent ASEAN in negotiating with other international actors such as the IAEA or any other dialogue partners.

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[99] Wan, *Regional Pathways*, 91.

[100] Ralf Emmers, "Unpacking ASEAN Neutrality: The Quest for Autonomy and Impartiality in Southeast Asia," *Contemporary Southeast Asia* 40, no. 3 (2018), 362-365.

Article 2 of the ASEAN Charter refers to informal principles and practices of ASEAN members, the so-called "ASEAN Way". It covers the principles of national sovereignty, non-intervention, consultation basis, and peaceful dispute settlement. In case of the ASEANTOM, these principles truly form the determination of structures and modalities on how the ASEANTOM works. As aforementioned, ASEAN, as an inter-governmental organisation, puts forth national sovereignty over intra-regional power. This is why the ASEANTOM was designed as a platform for national organisations on nuclear energy rather than a supra-national mechanism. Moreover, the summary report of the First Meeting of the ASEANTOM noted some terms they agreed to use such as the word of "ASEAN Member States" to insist the principle of national sovereignty. The participants also concurred on the principle of "national willingness" to identify future action plans and other related activities of the network.[101]

Member states' preferences and capabilities

This sub-section reviews the nuclear preferences and capabilities in ASEAN countries before the establishment of the ASEANTOM in 2013. Capabilities examined in this sub-section refer to (1) capacity to produce nuclear power (2) balance between sources for energy supplies and electricity demand (3) existing nuclear regulatory bodies at that time. These components shaped the countries' need to go for nuclear power.

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[101] "Summary of the 1st Meeting of ASEAN Network of Regulatory Bodies on Atomic Energy (ASEANTOM)," ASEANTOM, accessed May 26, 2022, https://inis.iaea.org/collection/NCLCollectionStore/_Public/45/075/45075439.pdf. 45075439.pdf.

Brunei Darussalam

Brunei Darussalam had sufficient economic resources to produce nuclear power due to its high GDP per capita at 26,930 USD in 2006 with small number of population. The status of Brunei, although small, is an industrialised nation due to its technology-led industrial sectors such as oil exports and service industry. Brunei had skilled workers to cope with high-level technology. The country could also "outsource" to solve any problems.[102] At the same time, Brunei was rich from oil and gas exports. The amount of oil and natural gas reserves was high, sufficient to produce electricity to at least 2030. Realising this potential, Brunei shifted its sources for energy supply from oil to natural gas at the rate of 99% of the production.

Moreover, the equilibrium between electricity production capacities was slightly over the consumption. There had been a tendency that its energy demand would increase to 3.3 million tons of oil equivalent in 2030. Two key reasons were a high urbanisation rate and the development of transportation sector in the country. The urban development rate of Brunei was anticipated from 75% in 2002 to 85% by 2030. This rate was still low compared to the others. Brunei's intention to move forward with industrial development, especially transportation sector required a high need of energy supplies. This point was problematic to Brunei as its sources of electricity production chiefly depended upon oil and natural gas reserves.[103] This trend might affect the consideration to use nuclear energy in the future.

Brunei did not have any regulatory body on nuclear governance at that time. The only existing national institution was the Brunei Energy

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[102] Somboonpakron, *Nuclear Energy in Southeast Asia*, 30.

[103] Somboonpakron, *Nuclear Energy in Southeast Asia*, 16-17.

Association (BEnA). This association was established by its energy companies as a non-profit organisation in 2002, aiming to promote energy conservation and efficiency in general. It once invited the experts from South Korea to talk about the opportunity to go nuclear. In September 2007, the spokesperson of the association mentioned that the country might not pursue nuclear energy soon but it would seek a new source for its energy supply to replace the dependence on oil and gas reserve.104 Brunei was ready to possess nuclear power but was unlikely to do so due to additional cost. Being a member of the ASEANTOM was beneficial.

Cambodia

The conflict during the Cold War had deteriorated the quality of electricity infrastructure and electricity prices. Phnom Penh, the capital of Cambodia, counted from 70% electricity consumption of the whole country. The increase in electricity demand in Cambodia predominantly derived from its effort to industrialise the country. Industries, mostly manufacturing of textiles, garment, and shoes, ranked first in electricity consumption. As the area where Cambodian people lived was not big, it was likely that there was no need to pursue a nuclear power plant to meet energy demands.105 Furthermore, there were many concerns reflected by politicians and environmentalists on the plan to build a coal power plant in Sihanoukville. Some of them suggested that the government seek alternative energy supplies as they were less dangerous to public health.[106]

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104 Somboonpakron, *Nuclear Energy in Southeast Asia*, 26.

105 Somboonpakron, *Nuclear Energy in Southeast Asia*, 17-18.

106 Sovan Nguon, "S'ville coal-fired power plant fuels concerns for health, environment," *The Phnom Penh Post*, May15, 2008, https://www.phnompenhpost.com/business/sville-coal-fired-power-plant-fuels-concerns-health-environment.

Cambodia did not have any regulatory body either. The Ministry of Industry, Mines, and Energy (MIME) has played a leading role in the country's international cooperation and energy governance in general. The National Assembly passed the law on non-proliferation of WMD in October 2007. This law lays the groundwork for reinforcing the existing frameworks of the IAEA on nuclear safety and security. It totally bans the application, development, transfer of any sorts of WMD, including nuclear weapons, biochemical, radioactive, and chemical weapons. The enactment of this law was an attempt to underpin the feature on nuclear weapon-free ASEAN and Cambodia's commitment toward the global norms on nuclear issues. Cambodia wanted to position itself as a country that was not a threat to anyone.[107] Therefore, its presence in the ASEANTOM would be totally a plus, including the advancement of national image and capacity on nuclear governance in the country.

Indonesia

Indonesia had a long history of involvement in nuclear technology with support under the Atoms for Peace Program during the Cold War. It was not difficult for Indonesia to move forward with nuclear development due to its existing capacity. The National Nuclear Energy Agency (BATAN) worked closely with the IAEA to launch a large number of technical cooperation programs. There were 89 of 141 programs concerned nuclear energy development, the highest in the region. However, BATAN faced a serious problem of "brain drain". It had to seek young workforce to replace senior officers. At the same time, once the officers had reached an appropriate level of knowledge and expertise, they might leave the organisation.

[107] Xiaodan Du ed., "Cambodia approves law of non-proliferation of nuclear, chemical weapon," *CCTV*, October 14, 2009, http://english.cctv.com/20091014/103984.shtml.

According to Somboonpakron, this trend would not negatively influence the decision to pursue nuclear energy.[108]

More serious problem was an increasingly energy demand. Prasetijo assessed the projection of fuel mix for major power systems in Indonesia during 2010-2019 in the key four areas: Sumatra, Kalimantan, Sulawesi, and Jawa-Bali. His projection displayed a tendency of higher electricity consumption in each year. Alternative sources of energy supplies would not be sufficient to meet the energy demands of the Indonesians.[109] Simultaneously, traditional sources of electricity production such as coal was one of the root causes of haze pollution in the region. Esterman's report displayed the amount of fine dust in 2011 that caused Indonesia the highest number of premature deaths in the region. This number would be doubled by 2030.110 The intention of Indonesia to acquire nuclear power was very clear as the country passed two regulations: Law No. 17/2007 on National Long-term Development Plan 2005-2019 and Presidential Decree No. 5/2010 on National Mid-term Development Plan 2010-2014. The latter document indicated a need to "conduct a new feasibility studies of nuclear power plants at new sites".[111]

Indonesia had one of the most advanced national institutions and regulations related to nuclear energy governance. In addition to BATAN, Indonesia established the Nuclear Energy Regulatory Agency (BAPETEN)

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[108] Somboonpakron, *Nuclear Energy in Southeast Asia*, 87.

[109] Prasetijo, "Power Development Plan," 183.

[110] Isabel Esterman, "Southeast Asia's coal boom could cause 70,000 deaths per year by 2030, report says," *Mongabay*, January 16, 2017, https://news.mongabay.com/2017/01/southeast-asias-coal-boom-could-cause-70000-deaths-per-year-by-2030-report-says/.

[111] Prasetijo, "Power Development Plan," 185.

in 1997. This agency focuses on the provision of nuclear regulations and harmonisation with global and regional commitments. It also directed the policy on licensing and inspection systems.[112] On regulations, Indonesia had enacted a number of government regulations, presidential decrees, and BAPETEN chairman's regulations. Table 4 lists related Indonesia's regulations on nuclear energy.

[112] ACE, *Study on the Nuclear Legal and Regulatory Framework in ASEAN*, (Jakarta: ASEAN Centre for Energy, 2018), 22.

Table 4 Indonesia's applicable nuclear energy regulations before the establishment of the ASEANTOM[113]

Government Regulations	Presidential Decrees	BAPETEN Chairman's Regulations
- No. 26/2002 (Safety of Radioactive Material Transport) - No. 33/2007 (Safety of Ionizing Radiation and the Security of Radioactive Source) - No. 46/2009 (Limit of Liability for Nuclear Damages) - No. 54/2012 (Safety and Security of Nuclear Installations and Nuclear Material)	- No. 66/1999 (Radiation Risk and Subvention) - No. 187/1998 (The Establishments of BATAN and BAPETEN) - No. 46/2009 (Ratification to the Convention on Physical Protection of Nuclear Material) - No. 74/2012 (Nuclear Damage Liability)	- No. 2 Year 2005 (System on Accounting for and Control of Nuclear Material) - No. 3 Year 2011 (Safety Design of Power Reactor) - No. 7 Year 2011 (Design of Power Emergency Supply System for Power Reactor) - No. 2/2012 (The Protection Against International Hazard other than Fires and Explosions in the Design of Nuclear Power Plants

As a result, Indonesia was one of the countries most advanced to pursue nuclear energy in the region with equipped national regulations and institutions. It also had a number of experts and specialists that could be valuable resources for future development and decision on nuclear issues.

[113] ACE, *Study on the Nuclear Legal and Regulatory Framework in ASEAN*, 7.

Lao PDR

The case of Lao PDR was very similar to the case of Cambodia. There was a small need for electricity consumption as Laos had a small population, industrialisation, and urbanisation. According to Somboonpakron, 80% of Laotian people were in the agricultural sector, especially rice farming. Its main industries were mining and hydroelectric power export. The latter accounted for 30% of its GDP revenue. It was anticipated that the domestic electricity demand would not accelerate tremendously.[114] Laos is the only land-locked country in ASEAN. However, it attempted to turn this challenge into benefit by positioning itself as a land-linked country in order to attract more investment, tourist arrivals, and demands for exports.[115] The participation of Laos in the ASEANTOM would increase its involvement within the region and enhance its capacity because the Department of Science, Ministry of Science and Technology had been the only national entity for nuclear energy governance. Being a member of the network could help Laos catch up with other members. ASEANTOM could be a platform for bridging Laos with the world on nuclear issues.

Malaysia

Malaysia was close to Indonesia in term of the capacity to develop nuclear technology by itself given a number of technical cooperation programs and talented working officers under the Ministry of Science and

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[114] Somboonpakron, *Nuclear Energy in Southeast Asia*, 19-20.

[115] Gretchen A. Kunze, and V. Bruce J. Tolentino, "In Laos: Land-Linked not Land-Locked," The Asia Foundation, August 27, 2008, https://asiafoundation.org/2008/08/27/in-laos-land-linked-not-land-locked/.

Technology. 42 out of 94 projects in collaboration with the IAEA were related to nuclear energy. However, the problem of brain drain was not that serious in case of Malaysia. The country has been a leading country for the development of science, technology, and innovation in ASEAN. Nuclear Malaysia, a sub-agency, was established to "promote nuclear technology for industry and for energy production" as well as training programs to improve the capabilitiesof its personnel. With a large number of talented scientists, engineers, and technical administrators, it was possible for Malaysia to possess its own nuclear energy technology.[116]

The trend of increasing electricity demand for Malaysia was like other countries. Main sources of energy supplies in Malaysia derived from natural gas and crude oil (96.3% of energy production). At the same time, Malaysia exported its crude oil and oil products. The two main sectors, highly consuming the energy, were industrial and transportation sectors. Besides, the amount of electricity consumption in Malaysia originated from commercial, residential, and agricultural sectors.117 In the long run, the energy demand would be high but the case of Malaysia was quite different because it was planning to move forward the New Economic Model in 2010, aiming at the achievement of a high income status country. Malaysia expressed its intention to move toward tertiary industry, enabling clean energy technology to play more active role in national development. However, there could be a situation that both natural gas and coal replaced oil supply for electricity production.[118]

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[116] Somboonpakron, *Nuclear Energy in Southeast Asia*, 60-61.

[117] Chinhao Chong, Weidou Ni, Linwei Ma, Pei Liu and Zheng Li, "The Use of Energy in Malaysia: Tracing Energy Flows from Primary Source to End Use," *Energies* 8(2015): 2843.

[118] Chong et al., "The Use of Energy in Malaysia," 2847, 2853.

The existing Malaysia's national nuclear energy governance was very comprehensive. It set three main milestones for nuclear power development, covering raising awareness, negotiating the contracts, and operating the first nuclear power plant. Malaysia issued the Atomic Energy Licensing Act in 1984. This Act provides a comprehensive provision of nuclear energy-related activities. In addition, Malaysia had a number of institutions and set of rules for nuclear operation in the country: the Atomic Energy Licensing Board (AELB), Department of Occupational Safety and Health, Department of Environment, and Ministry of Housing and Local Government.[119] The presence of these organisations could be assumed that Malaysia deemed the construction of a nuclear power plant in multi-dimensional rather than technical. As a result, the presence of Malaysia in the network would be, probably, because of an anxiety of "missing the train", rather than capacity development.

Myanmar

Myanmar was rich in capital from exporting its natural resources such as oil and gas to its neighboring and Asian countries. Furthermore, it had abundant agricultural and mining resources, accounted for 43% of its export. Myanmar once lacked ability to advance its 15% payment for building a nuclear research reactor. However, it could mobilize financial resources to pay for the rest of the amount as the military government had full authority for resource mobilisation. Besides, there was some evidence that Myanmar gained some support from foreign countries such as Russia and China to develop talented workers for nuclear energy programs.[120] Tun referred to

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119 ACE, *Study on the Nuclear Legal and Regulatory Framework in ASEAN*, 7.

120 Somboonpakron, *Nuclear Energy in Southeast Asia*, 55-56.

some researchers' opinions that Myanmar had already established some nuclear facilities, such as reactors and enrichment facilities. Also, some observers expressed their concerns that Myanmar might acquire some advanced nuclear technology from its North Korean counterpart. However, this information was not proven.[121]

Myanmar had a balance between energy supplies and electricity demand as it was rich in natural resources. The capacity to afford electricity was higher than consumption. Myanmar positioned itself to be an exporter of electricity. It constructed a new infrastructure for generation and distribution in 2006. Two years later, Myanmar's general capacity accelerated. Its supply was over demand at 658.7 Megawatt, which was high compared to other ASEAN countries. Apart from main resources, such as oil and gas, Myanmar was also rich in hydropower and geothermal steam due to its geography. It had at least 29 dam projects under construction with India, China, and Thailand.[122] However, Myanmar encountered many blackouts because of its technical failures, such as cleavages in transmission yards, lines, and power plants. Other problems originated from natural conditions, including storms, strong winds, high temperatures, and lightning strikes. The system breakdowns occurred 12 times in 2011 and 14 times in 2012.[123]

Myanmar has expressed its interest in nuclear energy since 1956. The country founded the Atomic Energy Centre under the Union of Burma

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[121] Tun Thaung, "Myanmar and the Nuclear Option," in *Asia's Energy Trends and Developments Volume 1: Innovations and Alternative Energy Supplies* eds. Mark Hong and Amy Lugg (Singapore: World Scientific, 2013), 270.

[122] Somboonpakron, *Nuclear Energy in Southeast Asia*, 42-43, 46-47.

[123] Aung Shin, "The truth behind the blackouts," *Myanmar Times*, May 6, 2016, https://www.mmtimes.com/business/20167-the-truth-behind-the-blackouts.html.

Applied Research Institute. The objective of this institute was to develop capacity of its scientists. Later, Myanmar acceded the membership of the IAEA. Myanmar and the IAEA co-created programs on nuclear science for agriculture and medicine. In mid-1970s, they operated a small neutron generator at Yangon University. The acquisition of nuclear energy was prioritised by the military government in 1988 to be a "national debate". However, the IAEA rejected Myanmar's request asking for assistance to develop the research reactor because it had "no confidence" in Myanmar's elites. Therefore, Myanmar was looking for partners such as Russia and China to pursue national dream. It was likely that Myanmar had a very positive view toward nuclear energy. Nuclear energy was referred as "desirable for the long-term". However, the country shifted its stance in 2009 as the Ministry of Energy defined nuclear energy as an environmental risk.[124]

Philippines

The Philippines had sufficient financial resources to finish its nuclear power plant. In 2009, the Philippines finalised the payment to Westinghouse, a nuclear power plant construction company. Before the establishment of the ASEANTOM, there appeared a rising trend of economic development, like other ASEAN countries. Main sources of Philippine capital derived from high government spending, strong service sector, and remittances of Filipinos living abroad. However, the Philippines spent a lot of money to complete the construction of its famous but unused nuclear power plant, Bataan. The Philippines should have sufficient skilled labors to work for a nuclear program if it decided to go that way because the country was industrialised with diverse expertise in high-skilled industries. On its technical capacity, the

[124] Dalpino and Westmeyer, "Southeast Asia," 192-193.

Philippines was supported by the United States Atoms for Peace Program. The country also participated in a number of joint technical cooperation projects with the IAEA. The number of programs ranked second following Indonesia.[125]

The supply side of energy in the Philippines was higher than demand side at 10%. Its principal sources were coal, natural gas, and hydropower. Coal accounted for 40% of its electricity production. The country was highly dependent on coal. Thus, it required an import of coal for maintaining energy security in electricity. However, the Philippines might not be possible to afford the rising coal price in the global market in 2008. Two sources were further identified: geothermal and hydropower but the capacity of electricity production from these two sources was still low. The combination of these two sources could not afford a sharp rise in electricity demand.[126] Residential sector, particularly Manila Metropolitan Area, was the most important electricity consumer, followed by commercial and industrial sectors. An additional component of energy consumption was from urbanisation. There was an expectation that the urbanisation rate would increase from 60% in 2002 to 76% in 2030. Following this, there would be an increasing demand for electricity as well. This situation affected the government's decision on nuclear energy. The policy reoriented its direction when the government changed.[127]

The Philippines established the Philippine Atomic Energy Commission (PAEC), later evolved into the Philippine Nuclear Research Institute (PNRI).

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125 Somboonpakron, *Nuclear Energy in Southeast Asia*, 57-58, 61.

126 Somboonpakron, *Nuclear Energy in Southeast Asia*, 48-49.

127 Somboonpakron, *Nuclear Energy in Southeast Asia*, 44-45.

This institute has been the only regulatory body of the country under the Department of Science and Technology. It has several mandates and responsibilities, such as research and development activities on the application and technical issues related to radiation and nuclear techniques, supervision nuclear research reactors and other facilities, regulation of nuclear and radiation-related activities and export-import control, and so on.[128] There was a coordination between the institute and other related entities such as the National Power Corporation under the Department of Energy and the IAEA. The Philippines issued the Republic Act 2067 in 1958 to lay the groundwork for national regulations on nuclear safety.[129]

Singapore

Singapore had a high amount of capital and high-skilled labors for its advanced industrial sectors, such as oil refinement and consumer electronics. The usage of electricity in Singapore typically derived from residential and commercial sectors. The population was growing larger and requiring a higher standard of living. Singapore positions itself as a financial and logistics hub. This characteristic of commercial sector required a big amount of electricity. Considering the supply side, Singapore did not have any sources of alternative energy. It imported a large number of natural gas from Malaysia and Indonesia.[130]

The Radiation Protection and Nuclear Science Department (RPNSD) has been the key regulatory body of the country. This entity was established

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128 ACE, *Study on the Nuclear Legal and Regulatory Framework in ASEAN*, 25-26.

129 ACE, *Study on the Nuclear Legal and Regulatory Framework in ASEAN*, 13.

130 Somboonpakron, *Nuclear Energy in Southeast Asia*, 20-21, 24-25, 31.

under the National Environment Agency (NEA). Singapore enacted three regulations regarding the provision of nuclear 3S. They are Radiation Protection Regulations governing three different aspects: non-ionising radiation, ionising radiation, and transport of radioactive materials. Although Singapore was rich in human and technological resources, it had an intention not to pursue the nuclear energy. Prime Minister Lee Hsien Loong considered nuclear energy as an option in 2010 and assigned the Energy Studies Institute at National University of Singapore to conduct a feasibility study. The result stated that there would be higher risks than benefits given Singapore's geography. Singapore would not be ready for any emergency cases.[131]

Thailand

Thailand had been involved in the development of nuclear technology since the Cold War. Like some ASEAN countries, Thailand received technical and financial support from the Atoms for Peace Program and the IAEA. At first, it focused more on medical and agricultural objectives. Thailand participated in 106 projects in total. Approximately fifty of them concerned nuclear energy development.[132] There was a great electricity demand based on Thailand's economic development and urbanisation. One key reason for Thailand to acquire nuclear energy was reliance on energy sources from its neighbouring countries. This situation affected the status of energy security in the country. However, the civil society reflected negatively toward nuclear power plant due to security and health concerns.

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131 Dalpino and Westmeyer, "Southeast Asia," 190.

132 Somboonpakron, *Nuclear Energy in Southeast Asia*, 88-89.

Thailand established the Thai Atomic Energy Commission (Thai AEC) as its national regulatory body following the Atomic Energy for Peace Act in 1961. The OAP, initiator of the ASEANTOM, has been designated as Secretariat of this Commission. Adding to the Act in 1961, Thailand issued Ministerial Regulations on the practices of licensing and implementation of nuclear materials and its by-products. Apart from founding the ASEANTOM, the OAP has been a leading entity in announcing guidance, ordinance, and procedures to promote peaceful use of nuclear technology and to enact the international practices formulated by the IAEA at the national level. Thailand has ensured its commitment to the principle of nuclear non-proliferation and nuclear 3S.[133]

Viet Nam

The history of nuclear presence in Viet Nam can be traced back to the Cold War. The United States supported South Viet Nam to construct the Da Lat Research Reactor in 1963 under the Atoms for Peace Program. Later, this reactor was supported by Soviet fuel and assistance. Viet Nam co-worked with the IAEA in several projects since 1971. At first, Viet Nam's nuclear program focused on medical applications and agriculture. Among the total number of 95 projects, more than half of them related to nuclear energy. Although Viet Nam was active in pursuing nuclear energy, it encountered the same problems as many countries on shortage of human resources.[134] Viet Nam had several debates internally whether (1) nuclear power would be the cheapest energy (2) existing measures would be sufficient to tackle nuclear safety issue (3) Viet Nam would gain confidence from the international community.[135]

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133 ACE, *Study on the Nuclear Legal and Regulatory Framework in ASEAN*, 14-15.

134 Ibid.

135 Yarr and Nguyễn, "Vietnam," 168, 169-170, 174.

Viet Nam had the highest rate of electricity demand around 7.8% which accounted as the highest in the region. It was anticipated that Viet Nam would shift its trend from net exporter to importer of energy by 2020. Two main reasons behind this shift were rapid industrialisation and growth in service and industrial sectors. This trend would be higher in the future as the country was becoming richer. The main source of electricity derived from hydropower from the Northern part of the country, accounting for 62% of the whole energy portfolio, followed by oil and gas. Hydropower was not reliable due to uncertain natural conditions such as seasonal effects and droughts. This situation enabled Viet Nam to pursue nuclear power and import additional energy sources from its neighbouring countries such as China, Laos, and Cambodia.[136]

Viet Nam's nuclear energy program had been running under rigid control of political and bureaucratic entities. Given the nature of socialist regime, the policy on nuclear energy was top-down under the supervision of the Politburo. The Politburo has an authority to disseminate, generate, and endorse nuclear energy policies, national goals, and specific projects. There are various actors in the policy process on the basis of consensus. On national mechanisms, Viet Nam established several entities under the Ministry of Science and Technology, including Viet Nam Atomic Energy Commission (VAEC), Viet Nam Atomic Energy Agency (VAEA), and National Nuclear Safety Council (NNSC). The previous two organisations have been under the Ministry of Science and Technology, aiming to conduct research to support the application and development of activities for nuclear energy. While the NNSC has been rather a coordinating body of related ministries.[137]

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[136] Somboonpakron, *Nuclear Energy in Southeast Asia*, 74-75, 78-79.

[137] Yarr and Nguyễn, "Vietnam," 165-166.

Viet Nam had enacted 28 laws and regulations on nuclear safety and security from 1996-2011.[138] For the ASEANTOM, the Viet Nam Agency for Radiation and Nuclear Safety (VARANS) has served as the national focal point.

ASEAN member state's preferences and capabilities

After reviewing the situation in each country before the establishment of the ASEANTOM in 2012, the author sees some gaps in ASEAN capabilities to pursue the ASEANTOM. There is a general trend that some ASEAN countries, which had high level of capital and high-skilled workers together with a dire need in electricity demand, tended to pursue nuclear energy. It is likely that electricity demand would be a key driver of the motivation toward possession of nuclear power. National regulatory bodies and frameworks had already existed, either direct or indirect, in all ASEAN countries at the time of establishing the network. Some countries were more advanced as they enacted several laws and regulations at national and organisational levels. Given that the ASEANTOM required national willingness as a prerequisite condition for attendance, ASEAN member states' preferences and capabilities played a very important role. It should be noted that being a member of the ASEANTOM required no sacrifice of resources. This justification was also relevant to favourability of ASEAN countries toward the establishment of the network. Table 5 reviews ASEAN member states' preferences to attend the ASEANTOM.

[138] ACE, *Study on the Nuclear Legal and Regulatory Framework in ASEAN*, 16-17.

Table 5 ASEAN member states' preferences to attend the ASEANTOM[139]

Countries/ Issues	Capacity to produce nuclear power	Balance between sources for energy supplies and electricity demand	Existing national regulatory body and frameworks
Brunei Darussalam	High level of capital and high-skilled workers	Energy supplies over electricity demand	Yes
Cambodia	Low level of capital and low-skilled workers	Energy supplies over electricity demand	Yes
Indonesia	Low level of capital but high-skilled workers and good record on regulatory development	Electricity demand over energy supplies	Yes
Lao PDR	Low level of capital and low-skilled workers	Energy supplies over electricity demand	Yes
Malaysia	High level of capital and high-skilled workers	Energy supplies over electricity demand	Yes
Myanmar	Low level of capital and low-skilled workers	Energy supplies over electricity demand	Yes

[139] Compiled by the author.

Countries/ Issues	Capacity to produce nuclear power	Balance between sources for energy supplies and electricity demand	Existing national regulatory body and frameworks
Philippines	Low level of capital but high-skilled workers and good record on regulatory development	Energy supplies over electricity demand	Yes
Singapore	High level of capital and high-skilled workers	Electricity demand over energy supplies	Yes
Thailand	High level of capital and high-skilled workers	Electricity demand over energy supplies	Yes
Viet Nam	High level of capital and high-skilled workers	Electricity demand over energy supplies	Yes

3.3 Characterising ASEANTOM

This sub-section discussed the key characteristics of the ASEANTOM as influenced by the three factors: Thailand's leadership, global and regional norms, and ASEAN member states' preferences and capabilities. First of all, the author agrees with Dalpino and Westmeyer's article that ASEAN has been moving toward Globalist approach, which refers to ASEAN countries' commitment to international agreements and mechanisms. At the same time, global norms also lays the groundwork for the operation of the ASEANTOM as it includes all regulatory bodies of ASEAN countries. From the author's point of view, the emergence of the ASEANTOM reinforces the diffusion

of the global norms and institutions to promote nuclear non-proliferation and nuclear 3S. This is because the participants of the ASEANTOM totally agreed to employ the network as a single platform to work closely with the IAEA. According to the ASEANTOM's Action Plan 2014-2015, the IAEA was one of the active attendees who proposed the regional training courses and workshops on radiation detection techniques and maintenance of instruments, as well as nuclear and radioactive materials transport safety and security.

Second, although ASEAN has been moving toward Globalist approach, it still maintains the ASEAN Way strictly. The 2011 Fukushima Nuclear Accident and the emergence of the ASEAN Community were push factors drawing regional support from other member countries. As the executive of the OAP clearly stated, the ASEANTOM would be a "network" rather than a supranational organisation. This is because ASEAN has worked in the spirit of national willingness and respect for national sovereignty. Also, this network works on the basis of consultation rather than the formal assignment of duties and responsibilities. These features make the participants feel comfortable with the platform. In practice, the division of labor within the network follows the same guidelines. Explicitly, the countries who have high capacity for nuclear technology such as Indonesia, the Philippines, and Singapore have been very active in taking lead in a number of initiatives while some countries, who are very new to the issues, play less important role. However, this does not mean that they are disqualified from being members of the network.

This study paper asks three specific questions. Who were the initiators or leaders to propose the idea of cooperation and why? How had the

activities become a function of the cooperation? Why did the ASEANTOM evolve in this way? For the first question, it is explicit that Thailand played an important role in setting the agenda and providing platform for further discussion. However, offering only platforms was not sufficient to build a consensus among other ASEAN countries. Thailand proposed the idea through several channels such as the IAEA General Meeting, the meetings of related ASEAN ministers, and the Nuclear Security Summit in order to diffuse the idea regionally. Then, the country secured the idea by providing its own resources to maintain the momentum and maximised the benefit of existing norms and institutions. The ASEANTOM was finally established in 2012, followed by a series of meetings, workshops, and exchanges. The motivations behind Thailand's leadership might be its involvement in the building of ASEAN Community since 1967 and its national goals aiming for more competitiveness. Figure 2 explains the process leading to the establishment of the ASEANTOM briefly.

Figure 2 Process leading to the establishment of the ASEANTOM

The answers to the second and third questions are simple. The members of the ASEANTOM put forward the establishment and development of the network by following the 4Cs of ASEAN. The emergence of ASEAN Community and the concept of ASEAN Connectivity offered a conducive environment to call for further cooperation with other nuclear regulatory bodies in the region. At the same time, the members of the network emphasised the concept of ASEAN centrality by insisting on regional interest of ASEAN in the negotiation with partners. The last C, which is the ASEAN Charter, reflects in the modalities and guidelines on how the network has run. The principles comprise non-intervention, respect for national sovereignty, and consultation. These practices also influence the determination of the activities and issues discussed within the network. For example, main activities of this network are workshops, trainings, and exchanges because members are comfortable. They also gain some benefits from capacity-building programs. Besides, the participants put forth the emergency preparedness and radioactive monitoring as the priority as they realise that these measures are necessary for the future. If any nuclear accident took place in the region, other ASEAN countries should be ready to cope with emergency immediatelyand efficiently. To do so, there should be sufficient technical officers and technologies. At the same time, there would be a mobilisation of supporting teams or troops to the country where the accident occurred. This issue will be very sensitive as it touches upon the principle of non-intervention but the presence of ASEANTOM would enable efficient collaborative efforts without hesitation in the intervention issue.

4.
Ways Forward

4.1 Post-2015 regional nuclear institutions in ASEAN

On nuclear non-proliferation issue, the Council for Security Cooperation in the Asia Pacific (CSCAP) initiated the study group on WMD in order to accelerate regional awareness on proliferation. In 2008, the attendees of the ARF concurred on the establishment of the study group to evaluate the proliferation threats in the region. Underlining the need for greater counter-proliferation, the leaders required concrete actions built on the UNSC Resolution 1540. The findings conducted by this group were useful to identify the loopholes in the NPT and elimination of international black market in nuclear materials, components, and know-how. This group had held 18 meetings from 2005 to 2014.[140]

After the works of the study group on WMD were completed in 2014, there was a proposal to add a new focus to the missions of the study group. Non-Proliferation and Disarmament (NPD) Study Group was formed

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[140] "Countering the proliferation of weapons of mass destruction in the Asia Pacific," CSCAP, accessed May 26, 2022, http://www.cscap.org/index.php?page=Countering-the-proliferation-of-weapons-of-mass-destruction-in-the-Asia-Pacific.

with responsibilities to conduct capacity-building programs to enhance the implementation of international arrangements to enhance non-proliferation, disarmament, and peaceful use of nuclear technology in the Asia-Pacific region. The group directly reports to ARF Inter-Sessional Meeting on Non-Proliferation and Disarmament (ISM/NPD). NPD Study Group has two different characteristics from WMD Study Group. Firstly, it focuses on specific actions toward the solution of the problems rather than the identification of threat. Second, it reinforces the works of ARF, ADMM+, and APEC by encouraging the nation-states to fully implement and comply with their obligations under the international agreements. Table 6 concluded the expected outcomes from NPD Study Group.

Table 6 Expected outcomes from NPD Study Group[141]

Issues	Outputs
Non-proliferation	- The improvement of national model on the implementation of UNSC Resolution 1540 - The formation of a regional clearing house - The improvement of a template for assessing national capacity and requirements - The improvement of surveys to examine the attitudes of states toward non-proliferation instruments and controls of strategic trade - Searching for the best practices on the implementation of the Treaty

[141] "Nonproliferation and Disarmament (NPD)," CSCAP, accessed May 26, 2022, http://www.cscap.org/index.php?page=nonproliferation-and-disarmament-npd.

Issues	Outputs
Disarmament	- The de-legitimisation of nuclear weapons and possession - The de-emphasis of the use of nuclear weapons in the nuclear-armed states - The monitoring of the implementation of NPT review process
Peaceful use of nuclear technology	- The improvement of a work plan to promote self, secure, and proliferation-resistant nuclear governance in the region - The monitoring of the Nuclear Security Summit process - The improvement of specific transparency measures at both regional and national levels - Deeper examination of re-processing and enrichment-free zone proposals - The improvement of a work plan or action plan for newly-established regional organisations such as ASEANTOM and ANSN

In ASEAN, NEC-SSN, ASEANTOM, and SEANWFZ are three core regional mechanisms on nuclear issues. Principally, ASEAN countries are committed by the ASEAN Charter to promoting nuclear-free ASEAN. Practically, ASEAN member states have disciplined themselves from developing any nuclear weapons. At the 11th EAS meeting in 2016, EAS leaders reinforced their support to the ongoing international cooperation on non-proliferation, prevention of nuclear terrorism, and peaceful uses of nuclear energy at all

levels. This matter was re-emphasised by the EAS Leader's Statement in 2018. The leaders called further for closer cooperation with the IAEA and other related international regimes, including NPT. The leaders expressed their support to the works of ASEANTOM and encouraged the member states to secure the territory from nuclear and other radioactive materials. They encouraged the concerned member states to diminish highly enriched uranium in civilian stocks and employ low enriched uranium for technical and economic purpose where necessary.

To build on the continuity of ASEAN plan on energy, ASEAN leaders endorsed APAEC 2016-2025. There is a project plan on civilian use of nuclear energy under the plan. The objective of this plan is to further support the works of NEC-SSN at the regional level. This plan outlined two key achievements of ASEAN works to promote peaceful use of nuclear energy from 2010 to 2015: the development of courses and workshops for more than 100 ASEAN senior policymakers in collaboration with ASEAN dialogue partners and the conduct of survey reflecting the necessity of nuclear cooperation for each country in 2012. This plan states three main outcomes for the first phase of implementation: the capacity-building for nuclear policymakers, the promotion of public awareness toward nuclear energy, and the reinforcement of regional cooperation on nuclear.[142]

However, a comprehensive regional institution on nuclear issues in ASEAN is still debatable. As explained, the participation of ASEAN countries in the global regimes on WMD non-proliferation is voluntary. The member states reserve their full autonomy to decide on the participation. Although

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[142] ACE, *ASEAN Plan of Action for Energy Cooperation (APAEC) 2016-2025* (Jakarta: ASEAN Centre for Energy, 2015), 41-43.

most ASEAN countries have ratified or been a signatory of global conventions and initiatives, the quality of regime participation, such as the submission of reports, is another story. At the regional level, there are a number of regional mechanisms related to the nuclear non-proliferation, safety, and security in ASEAN, which have different priorities. For example, the ASEAN Ministerial Meeting on Transnational Crime (AMMTC) focuses more on the measures to prevent terrorism and extremism in the region.

Furthermore, the study by the ACE outlined five challenges in strengthening regional nuclear safety regime in the region. First, the national adoption of nuclear safety and security regulations might take time due to complex legislative process of each country. Second, there should be a single window system for submitting the documents. Third, it is required for each country to develop higher standard to reach IAEA standards. Fourth, there might be an issue on the conflict of interest as the regulatory body of each country is not independent. Finally, there should be effective communication and clear authority between the agencies in order to improve the inter-agency coordination.[143] It is exactly the missions and responsibilities of the ASEANTOM to narrow these gaps by enhancing the capacity of its members.

4.2 Suggestions for future research

The author suggests two comments for future research, the first is the identification of a new set of independent variables as an analytical framework for regional cooperation on nuclear non-proliferation, safety, and security. It is possible to use regional institution as a dependent variable.

[143] ACE, *Study on the Nuclear Legal and Regulatory Framework in ASEAN*, 47.

Region here can be defined as an establishment or a path toward regional nuclear order/institution/mechanism. In case of ASEAN, the willingness of member states is required due to the specific characteristic of ASEAN as an inter-governmental organisation. Therefore, further comparative analysis with different groundwork of comparison or different regions can enhance the dissemination on regional pathways to nuclear non-proliferation, disarmament, and peaceful use of nuclear technology.

Second, this work provides a case study of institutional development in ASEAN. There is a space for comparative analyses across time and region. Other dimensions include the influence of ASEAN dialogue partners on the decision or formation of states' preferences and willingness to advance regional development. Also, theoretical approach might be an interesting framework to examine nuclear non-proliferation in ASEAN. One can explore the case by fully applying the rigorous realist, liberalist, constructivist framework, or so on.

4.3 Conclusion

The nuclear issue is not new for ASEAN countries. At the global level, almost all ASEAN countries ratified and acceded to the NPT during the 1970s-1980s. Furthermore, most of them have been the parties of several global nuclear regimes, including the Comprehensive Safeguards Agreement, the Convention on Nuclear Safety, the Convention on Early Notification of a Nuclear Accident, the Nuclear Terrorism Convention, and so on. Four ASEAN countries consisting of Thailand, Viet Nam, the Philippines, and Indonesia, operated nuclear research reactors. Among these four countries, the Philippines was the only member having plan to construct a nuclear

power plant. However, it had to prolong the plan for two times due to concerns over nuclear safety and security after the Three Mile Island NuclearAccident in 1979 and the Chernobyl Nuclear Accident in 1986. As an immediate reaction to the Fukushima Nuclear Accident in 2011, ASEAN countries decided to prolong their plans to build nuclear power plants. They also determined setting up a regional mechanism on nuclear safeguards, safety, and security, also known as nuclear 3S, for the first time.

This study paper argues that ASEAN has been taking a Globalist approach on nuclear non-proliferation and energy issues, meaning the countries prefer regional mechanisms to promote peace and security and actively support the existing international regimes concerning nuclear weapon and energy issues. In ASEAN, there are three principal regional mechanisms on regional nuclear energy: SEANWFZ, NEC-SSN, and ASEANTOM. In case of ASEANTOM, there are three key factors determining institutional design and development. the three factors determining the creation and institutional development of ASEANTOM are (1) Thailand's proactive leadership, (2) global and regional norms, and (3) ASEAN member countries' preferences and capabilities. However, some challenges lie ahead. The relevance of ASEAN regional mechanisms, including SEANWFZ, NEC-SSN, and ASEANTOM, in the current circumstances of ongoing great powers competition remain to be seen.

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