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**THE MIDDLE POWER TRAP AND THE STRUGGLE FOR STATUS: How the
Nonproliferation regime hampered the aspirations of emerging regional powers**

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Nonproliferation regime hampered the aspirations of emerging regional powers**

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To my uncle Ruy Morato, the wisest man I have ever come across

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RESUMO

Esta pesquisa investiga se o estabelecimento de regimes internacionais gera efeitos colaterais no desenvolvimento científico de potências regionais emergentes. Para abordar essa questão, o estudo se aprofunda no regime de não proliferação durante a Guerra Fria. Foi um período em que foram estabelecidos mecanismos de não proliferação devido ao interesse demonstrado por vários estados no campo nuclear. Por meio de um design de pesquisa qualitativa para avaliar o raciocínio por trás da relutância das potências regionais emergentes em obedecer às regras de não proliferação, este estudo revela a existência de um mecanismo causal em nível estrutural chamado de Armadilha das Potências Médias (MPT, na sigla em inglês). Refere-se às tentativas das grandes potências de fazer com que outros estados acatem suas regras internacionais para preservar o status quo e, assim, persuadi-los a se comportarem diplomaticamente como potências médias tradicionais que respeitam normas e levantam questões dentro de organizações prescritas. Essa contribuição teórica aprimora abordagens críticas nas Relações Internacionais (RI) sobre estigmatização e disputas de status. Além disso, o trabalho analisa as histórias nucleares do Brasil para observar como as potências regionais emergentes lidaram com forças externas que impediram seu desenvolvimento científico. O estudo tenta explicar o resultado observado na história brasileira (adesão aos instrumentos de não proliferação) por meio de uma análise de rastreamento de processo. Por fim, reforça a inferência ao retratar um caso oculto: a história nuclear da Índia.

Palavras-chave: 'Armadilha das Potências Médias'; 'Relações Internacionais'; 'Desenvolvimento Científico'; 'Regimes Internacionais'; 'Proliferação Nuclear'; 'Programa Nuclear Brasileiro'.

ABSTRACT

This research investigates if the establishment of international regimes produces side effects on the scientific development of emerging regional powers. To address this puzzle, this work delves into the nonproliferation regime during the Cold War. It was the period when nonproliferation mechanisms were established because several states demonstrated interest in the nuclear field. By undertaking a qualitative research design to assess the reasoning behind the reluctance of emerging regional powers to abide by nonproliferation rules, this study unveils the existence of a structural-level causal mechanism named the Middle Power Trap (MPT). It refers to great powers' attempts to make other states acquiesce to their international rules to preserve the status quo and thereby, persuade them to diplomatically behave like traditional middle powers who respect norms and raise issues inside prescribed organizations. Such a theoretical contribution refines critical International Relations (IR) approaches to stigmatization and disputes for status. Hence, this work analyzes the nuclear histories of Brazil to observe how emerging regional powers coped with external forces hindering their scientific development. This study tries to explain the observed outcome in Brazilian history (acquiesced to the nonproliferation instruments) by undertaking a process-tracing analysis. Finally, I reinforce the inference depicting a shadow case: the Indian nuclear history.

Key-words: 'Middle Power Trap'; 'International Relations'; 'Scientific Development'; 'International Regimes'; 'Nuclear Proliferation'; 'Brazilian Nuclear Program'.

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ABBREVIATION LIST

ABACC	Brazilian–Argentine Agency for Accounting and Control of Nuclear Materials
ABC	Brazilian Scientific Association
ACDA	United States Arms Control and Disarmament Agency
AEC	Atomic Energy Commission of India
AGR	Advanced Gas cooled Reactor
Avibras	Avibras Indústria Aeroespacial S/A
BARC	Bhabha Atomic Research Centre
BWR	Boiling Water Reactor
CBTN	Brazilian Company of Nuclear Technology
CDTN	Nuclear Technology Development Center – Belo Horizonte
CENA	Centro de Energia Nuclear na Agricultura
CIA	Central Intelligence Agency
CINC	Composite Index of National Capability
CIRUS	Canada India Reactor Utility Services
CNPq	National Council for Scientific and Technological Development
CPDOC-FGV	Contemporary Brazilian History Research and Documentation Center
COMECON	Council for Mutual Economic Assistance
CSA	Comprehensive safeguards agreements
CoW	Correlates of War
DAAD	Deutscher Akademischer Austauschdienst
DAE	Department of Atomic Energy [India]
DoS	United States Department of State
ENCD	Eighteen Nations Committee on Disarmament
Euratom	European Atomic Energy Community

FBR	Fast Breeder Reactor
GDP	Gross Development Product
HWR	Heavy Water Reactor
HWGCR	Heavy Water Gas Cooled Reactor
HWOGR	Heavy Water Cooled Reactor
IACS	Indian Association for the Cultivation of Science
IAEA	International Atomic Energy Agency
ICRP	International Commission on Radiological Protection
IDSA	Institute for Defence Studies and Analyses
IEA	Instituto de Energia Atômica
IEA-R1	Instituto de Energia Atômica – Reator 1
IEN	Instituto de Energia Nuclear – Rio de Janeiro
IGCAR	Indira Gandhi Centre for Atomic Research
IISc	Indian Institute of Science
INFCIRC	Information Circulars (IAEA)
IPEN	Energy and Nuclear Research Institute
IPR	Institute for Radioactive Research
IR	International Relations
IRC	International Radiation Commission
ISRO	Indian Space Research Organisation
Itamaraty	Ministry of Foreign Relations (Brazil)
MAE	Ministry of Foreign Relations (Italy)
MAPS	Madras Atomic Power Station
MAST	Museu de Astronomia e Ciências Afins [Museum of Astronomy and Science]
MEA	Ministry of External Affairs of India
MIBRA	Monazita Ilmenita do Brasil
MLF	Multilateral Force
MTCR	Missile Technology Control Regime

NAPS	Narora Atomic Power Station
NATO	North Atlantic Treaty Organization
NNC	Conference of Non-Nuclear Weapon States
NPT	Treaty on the Non-Proliferation of Nuclear Weapons
NUCLAM	Nucleabrás Auxiliar de Mineração S.A
NUCLEMON	Nuclemon Mínero-Química Ltda
NUCLEN	Nuclebrás Engenharia S.A
NUCLEI	Nuclebrás Enriquecimento Isotópico S.A.
NUCLEP	Nuclebrás Equipamento Pesados S.A.
NWS	Nuclear Weapon States
NNWS	Non-Nuclear Weapon States
OECD	Organization for Economic Co-operation and Development
OPANAL	Agency for the Prohibition of Nuclear Weapons in Latin America and the Caribbean.
ORF	Observer Research Foundation (India)
PHWR	Pressurized Heavy Water Reactor
PTBT	Partial Test Ban Treaty
PUREX	Plutonium Uranium Reduction Extraction
PURNIMA	Plutonium Reactor for Neutron Investigations in Multiplying Assemblies
PWR	Pressurized Water Reactor
RAPS	Rawatbhata nuclear power station
RevCon	NPT Review Conference
RMB	Brazilian Multipurpose Reactor
SBPC	Brazilian Society for the Progress of Science
SFR	Sodium-cooled Fast Reactor
SIPRI	Stockholm International Peace Research Institute
S&T	Science and Technology
SUS	National Health Service (Brazil)
TAPS	Tarapur Atomic Power Station

TIFR	Tata Institute of Fundamental Research
TNCD	Ten Nations Committee on Disarmament
UFMG	Federal University of Minas Gerais
UFPE	Federal University of Pernambuco
UM	United Nations
UNAEC	United Nations Atomic Energy Commission
UNESC	United Nations Economic and Social Council
UNGA	United Nations General Assembly
UNIDIR	United Nations Institute for Disarmament Research
UNODA	United Nations Office for Disarmament Affairs
UNSC	United Nations Security Council
UNSCEAR	The United Nations Scientific Committee on the Effects of Atomic Radiation
Urenco	Uranium Enrichment Consortium
USP	University of São Paulo
VOA	Voluntary Offer safeguards agreements
WTO	World Trade Organization
WWI	World War I
WWII	World War II
ZERLINA	Zero Energy Reactor for Lattice Investigations and New Assemblies
ZPACS	South Atlantic Peace and Cooperation Zone

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1. INTRODUCTION

This study aims to contribute to solving an IR long-lasting puzzle: do international regimes¹ produce side effects on the development of Global South² states? The mainstream literature usually concurs that international regimes promote cooperative ties in an anarchic structure (ALTER; RAUSTIALA, 2018; KEOHANE, 1982) with just a few exceptions from the Waltzian realism (see Waltz 1981). However, critical strands claim these regulatory instruments underpin international hierarchical dynamics by assigning different roles and rules to countries depending on their social status³ (RUZICKA, 2018; SAHA, 2022; STRANGE, 1982). In other words, international regimes would favor great powers⁴ interests by granting normative legitimacy to their activities aimed at preserving an existing *status quo* – or, in an IR perspective: a world order⁵ (COX, 1992; KEELEY, 1990; ONDERCO, 2015). Based on this vision, experts and practitioners complain Global South countries would face more hardships to advance in the S&T realm or economic development vis-à-vis the great powers (Singh 1998; Mathur 2016).

Recent critical studies (ONDERCO, 2015; SAHA, 2022; SMETANA, 2020) advanced on this debate by addressing a more specific question: if international regimes could hamper the development of some states, why do they abide by their rules even if they disagree with the proposed rules? This topic is not a novelty to IR studies because previous works have already provided different theoretical explanations (KEOHANE, 1982; KREPS; AREND, 2006; NYE,

¹ To sum up, I assume international regimes are sets of norms, organizations, principles, rules, and decision-making procedures aimed to regulate a given issue area. A more in-depth debate about this topic follows in the Chapter 3.

² Although this work is an analysis about a Cold War phenomenon, it gives preference to the term Global South instead of Third World due to anticolonial issues. In this research, it is possible to consider Global South and Third World synonyms.

³ Status is a buzzword for IR studies (WOLF, 2019) because it is not easy to measure. Accommodating these disputes is a thorny issue. Thus, this concept is grasped as a positional/social standing where other members recognize the role of an agent inside the order (CASARÔES, 2020; DE CARVALHO, 2020; WOHLFORTH et al., 2018).

⁴ Great powers (or leading states and NWSs) are the most powerful and influential countries in the world during a certain period. Other countries legitimate them to manage international crises once they present valuable elements. They have the right to set rules and sustain advanced military technologies. These countries dispute among each other the consolidation of specific geopolitical aims. CoW database developed the CINC that is composed of six variables: military expenditure, military personnel, energy consumption, iron, and steel production, urban population, and total population. This indicator measures national amounts of material capabilities. Realist authors agree that great powers are countries that score systematically a value above 0.1 during a scrutinized period. During the Cold War, China, France, the United Kingdom, the United States, and the Soviet Union were the only states to score these values in the CINC. However, this study considers material capability only a necessary condition for a great power. Intersubjective elements, like normative influence, also play a decisive role to consider whether a state joins this exclusive club.

⁵ This dissertation does not employ the terms “international system” and “world order” as synonym. The system is just the analytical structure. If there is a world order, it revolves around the interactions and power relationships observed in the structural context.

1985) - as I will describe in chapter 3. However, this literature (ADLER-NISSEN, 2014; SMETANA, 2020; WAGNER; WERNER; ONDERCO, 2014) opened new avenues to suggest an absorbing solution: these states tend to consent to international regimes because of social pressures (e.g., stigmatization⁶) (Zarakol 2014) that socially legitimize material punishments (e.g., economic and diplomatic sanctions or the use of military force) against potential detractors (see Saha 2022; Zarakol 2010). By dealing with countries as unity of analysis in constant social interaction (like a human society), these works emphasize subjective dynamics antecede the possible employment of material capabilities to constrain “rebel behavior” (SMETANA, 2020).

Nuclear nonproliferation history is the focus of many studies of this analytical field because of the following four reasons:

- The merged epistemological debate about how this regime could preserve global peace and ease cooperative ties among states. The nonproliferation regime comprises three pillars: (a) the nonproliferation - (i.e., avoid the spread of atomic weapons throughout the world); (b) the disarmament - (i.e., encourage NWSs to dismantle their nuclear arsenals); and (c) the promotion of the peaceful use of nuclear technologies. A status-related criticism resides in the NPT Article IX §3 that divides the world into two classes of states: NWSs who have manufactured or exploded nuclear explosive devices before 1 January 1967 (i.e., the US, the United Kingdom, the Soviet Union, France and China), and the other so-called NNWSs. Whereas NWSs committed themselves to reduce their nuclear arsenals and cooperate with NNWSs on scientific issues (NPT Article IV), NNWSs had to comply with IAEA safeguard systems and rules that restricted the access to needed materials to develop their nuclear programs (NPT Article III §1).
- The global coverage. The NPT is the cornerstone of this regime⁷. It has been signed by 191 sovereign states. Some scholars and practitioners advocated the NPT demonstrated the usefulness of the UN in handling international issues via binding commitments that encourage countries to adhere to the rules (Davis and Jasper 2014; Deudney 2014;

⁶ Stigmatization is not a synonym of pariah (a positional status). The former means a process of shaming another agent by discrediting its ambitions and values. It serves to pressure others to avoid assuming divergent interests (Zarakol 2010). Stigmatization, therefore, is grasped according to an Erving Goffman’s definition (see Adler-Nissen 2014). Such a topic will be explained latter, but it is a process whereby socialized agents shun certain states due to their supposed “deviant behavior” – which is a sort of transgression against “normalness”. An extreme instance is isolating this member via sanctions, diplomatic quarrels, to name a few options. Hence stigmatization can lead a member to a position of pariah.

⁷ Besides NPT, the UN held other debates and promoted an array of agreements addressing the use of nuclear energy, production of weapons, and scientific developments and procedures (see Annex 1).

Holum 1994; Ikenberry 2020a; Thayer 1995). Hence, the nonproliferation regime comprises different sorts of countries from all inhabited continents.

- The subject. IR studies pay too much attention to the military-led purposes of nuclear materials – regardless of the importance of their civil-led use. Atomic energy can produce electric power or be employed in health treatments and other technological fields. It matters to international politics because the peaceful use of nuclear energy can enhance national economic and social development. Building a robust nuclear program can be a political goal (DALAQUA, 2019; HECHT, 2009; KRIGE; WANG, 2015) since it means an S&T-related prestige (FIKENSCHER; JASCHOB; WOLF, 2015). It was noticed mainly during the Cold War (HECHT, 2011) when nuclear energy was a cutting-edge technology mastered by advanced academic centers (ADLER, 1987). Thus, regulations over scientific advancements cope with the criticism from countries that judge them as unfair to their developmental ambitions.
- The purpose and the context. The nonproliferation regime aims to regulate an appealing technology that countries were keen on employing to boost their economic and scientific development and promote industrialization (SARKAR, 2022). However, atomic technologies can be diverted to produce weapons of mass destruction. This dual-use logic encourages the establishment of regulating instruments in an unequal world where some countries enjoy more influential assets than other states.

In conclusion, the nuclear nonproliferation case is relevant to this context because of their contradictions and pervasiveness (see Ruzicka 2019). Since this regime aims to reduce the risks of a nuclear hecatomb, countries have incentives to join and legitimize these efforts (RUZICKA, 2018). Yet, the failure to advance the disarmament of NWSs frustrates many NNWSs (PELOPIDAS, 2022; PRETORIUS; SAUER, 2022). The fact that imposing regulations over the atomic-related market and scientific experiments could hinder the establishment of nuclear programs in NNWSs increases the disillusion with nonproliferation rules among states aiming at indigenously mastering nuclear technologies production and mineral enrichment cycles (DE ARAUJO CASTRO, 1972).

Whereas the NWS established their nuclear programs more freely by conducting tests and experiments without reporting their scientific developments to international mechanisms (see Pelopidas 2012), NNWSs could not follow the same path and had to rely on the assist from NWSs – according to the NPT. In this sense, NNWSs could face prickly situations in advancing their scientific projects. Failing to comply with rules could spark a stigmatization process

(SMETANA, 2020), although great powers avoided robust movements towards their nuclear disarmament (MADDOCK, 2010).

Such paradoxical ties between scientific progress and global menaces assume a compelling dimension to the IR domain since it is not detached from geopolitical dynamics like the unequal global distribution of power (KRIGE; BARTH, 2006). Great powers are industrialized nations endowed with military, diplomatic, and economic assets (COE; VAYNMAN, 2015; DROGAN, 2019; KRIGE; SARKAR, 2018). For instance, they hold most scientific patents and led initiatives to preserve global peace via UNSC votes. Thus, they usually preserve their interests more easily than other countries during international negotiations (KUPCHAN, 2014; ONDERCO, 2015; RODRIK; WALT, 2021). Because of these aspects, this dissertation delves into the possible correlation between international regimes and their impacts on the development of NNWSs countries. I will conduct a qualitative historical research – applying process tracing as a method of analysis – to understand both (1) whether and (2) how the nuclear nonproliferation regime could affect the development of emerging regional powers.

As I depict in chapter 2, these countries are at the edge of acquiring similar scientific/material capabilities⁸ of great powers and are influential players inside their regions. However, they do not hold sway over international negotiations (NOLTE, 2010). Even these states can enjoy punctual sectorial influence (e.g., environmental discussions, human rights, trade, demographic issues) (MILANI; PINHEIRO; DE LIMA, 2017), great powers are the only actors who are socially accepted to exercise the role of decision-makers⁹ (KEOHANE, 1969; LARSON; PAUL; WOHLFORTH, 2014; WOHLFORTH, 2009). Emerging regional powers, in this sense, do not hold ideational resources that legitimate their interests and make them credible agents to tackle global issues (LAKE, 2017; NYE JR, 2004).

On S&T topics, for example, prior studies noticed that emerging regional powers usually seek self-reliance on sensitive procedures (e.g., nuclear autonomy¹⁰) for vital areas such as

⁸ This study uses the CoW's indicator CINC to measure and define material capabilities.

⁹ It is an important issue. Despite the growing body of literature claiming Global South countries have been central to the evolution of international regimes and institutions, their participation occurred in accepted negotiations by the great powers. Great powers are the only agents to play the role of decision-makers without fearing possible constraints from other agents. It is acknowledged that some studies demonstrated how Latin American countries shaped international norms (SCARFI, 2017; TOURINHO, 2021), but they do not enjoy the same capabilities to spread values and lead negotiations like the United States. From Bourdieu's standpoint, agents that hold valorized elements dispose of mechanisms to influence structural aspects. Whereas great powers have agency over the draw of world order, other countries serve to legitimize or react to this context.

¹⁰ The concept "nuclear autonomy" represents national efforts to produce and master necessary scientific studies and technologies to perform entirely fertile materials enrichment cycles in the country. For instance, nuclear autonomy means the state's capacity to use atomic assets through national technologies and procedures. Autonomy

economic development (ADLER, 1987; EVANS; TIGRE, 1989; HURRELL, 1986). It is reasonable to suggest that these countries invest in initiatives that bring social prestige¹¹ for them among states – e.g., scientific accomplishments – to signalize they deserve the treatment conferred to great powers¹² (GILADY, 2018). However, they run the risk of being treated as rebel agents interested in throwing the world into disarray. This argument is pervasive even inside academia due to the materialistic theory on hegemonic/power transition that considers emerging regional powers as risk-acceptant agents to overcome existing world order (see Gilpin 1981; Modelski 1987).

Since emerging regional powers are not amenable to accepting arrangements drafted by other states (LARSON; SHEVCHENKO, 2014; PU; SCHWELLER, 2014; WARD, 2017), NWSs spend more resources trying to enforce rules to these countries than traditional Middle Powers¹³ such as Australia, Belgium, Canada, and South Korea (COOPER; HIGGOTT; NOSSAL, 1993; LOPES; CASARÕES; GAMA, 2020). Likewise, these countries do not belong to the Western world¹⁴. They are relevant members of the Global South. Western normative premises sound to them like exogenous standards (see Zarakol 2010) that they need

is a concept defined as the capacity of a state to fulfill its objectives of handling an issue by indigenous attributes. It consists of a robust level of independence in the referred area (Hurrell 1986; Jaguaribe 1979). It does not mean a state can work completely outside the international market. This study believes this independence means developing a nuclear industry that can perform the role of supplier in this market (not only clients of foreign technology). In this sense, it can assume a position without huge constraints from other states because of its S&T development.

¹¹ Prestige is the subjective asset whereby states become legitimate actors to play a given role according to social understandings. There is an extensive literature about this in IR studies. Among them, realist authors such as Gilpin (1981) considered prestige as the currency of diplomacy. Other recent approaches refined this definition and set relevant discussions about this concept, see (Khong 2019; Kim 2004; Kim and Gates 2015; Larson, Paul, and Wohlforth 2014; Morgenthau 2003; Renshon 2017).

¹² States are agents that work such as individuals in a society. They pursue natural interests. Although their aspirations can vary, it is normal that some, who enjoy of valorized assets, dispute leading positions. Dispute for power and influence, for instance, are considered natural aspects of international life. Unlike lower-level-of-abstraction theories and materialist frameworks, this study assumes that systemic factors play decisive roles to constrain or define the aspirations of each state.

¹³ I acknowledge that there is no consensus in the existing literature about the diplomatic behavior of traditional middle powers. However, the purpose of this text revolves around discussing how the nonproliferation regime preserved the international hierarchy among states. In this sense, I understand middle and emerging powers as different kinds of countries due to their status ambitions and diplomatic strategies. Indeed, I recognize these adopted terminologies hinge on ideal archetypal that respond to *grosso modo* observed diplomatic behavior of these groups. Yet, there are small and middle powers that assume deviant behaviors due to geopolitical and idiosyncratic reasons. I employ the word “traditional” to reinforce our focus on states that share a proclivity for working in multilateral negotiations. As previous studies noticed, nonproliferation issues configure a typical example of how traditional middle powers favor multilateral decisions and order preservation (see Barnes 2010). I address this debate more in-depth during the section 2.2.

¹⁴ On the geographical aspect, this assumption does not make any sense. Brazil, for example, is in South America. Nevertheless, the concept of the Western world means the First World during the Cold War. That area ranges from North America to Western Europe. In this sense, there is Brazilian literature about the identity of this country placed in the Western hemisphere that is not a member of political alliances from the Western world (see Guimarães 2020; Lopes 2020; UN 1963).

to follow to attain the social status of great power (LOPES; CASARÕES; GAMA, 2020). In this sense, as Patil (2023) argued, NWSs attempt to make these countries abide by rules because they represent kinds of Global South leaderships – so, other NNWSs would be encouraged to follow the example.

By delving into this subject, I target two sub-fields from the original discussion about the impacts of international regimes over the development of countries: (a) the scholarship on emerging regional powers' struggle for status and (b) the relevance of S&T to IR studies. The justification for focusing on these two areas consists of three main reasons:

- This approach permits the refinement of the explanatory potential of IR "schools of thought"¹⁵ that consider both subjective and material factors and assumes international relations gravitate over asymmetrical power dynamics between states. For these works, temporal elements attest to the existence of a hierarchical political field composed of states whereby leaderships detain persuasive and material power to enforce rules to newcomers or less influential actors (ADLER-NISSEN, 2013; BIGO, 2011). This effort provides valuable insights into the debates about the role of international regimes.
- It enables an in-depth investigation of whether an important S&T-related international regime augur in favor of great powers' interests by legitimating their agency over global affairs and reducing potential disruptive actions against the world order (see Chapter 5). By investigating this topic, this dissertation aspires to contribute to the debate about the relationship between great powers and international regimes.
- Such a research design allows an understanding of how emerging regional powers cope with external causal forces against their nuclear ambitions. Ergo, it would be possible to analyze how these foreign-led instruments incentives the change on emerging regional powers' nuclear-related S&T policies (KRIGE; SARKAR, 2018; MONTGOMERY, 2013). These findings supply the critical literature with new insights into how agents react to external pressures.

Having said that, I can summarize this dissertation's specific aim as follows. This study sets an explaining-outcome (see Beach and Pedersen 2019) research to assess the causal chain that

¹⁵ That is the reasoning behind the preference to employ the terminology "school of thought" instead of simply "theory". Unlike a theory, schools of thought hinge on a cluster of theoretical frameworks that share explanatory similarities. This concept means, in this sense, groups of theories that employ similar perspectives to understand specific phenomena.

drive emerging regional powers toward acquiescing to nonproliferation mechanisms and, consequently, forego their S&T developmental ambitions. By employing an inductive approach via primary sources analysis (Chapter 2), I seek to embolden the IR critical knowledge about nuclear proliferation by considering the historical experiences of emerging regional powers¹⁶ in coping with external causal forces targeting their S&T development.

As prior studies have opened the avenues to assess how nonproliferation instruments can reduce the possibilities of some countries to attain their aspirations and restrict the access of some assets or developmental strategies to a few privileged states, I decided to depart from a systematization of these theoretical contributions. As explain in chapter 4, this literature still lacks a more robust effort to systematize their findings into a single explanatory hypothesis. Thus, I realized this inductive historical exercise could robust critical argument because primary sources from emerging regional powers unveil empirically how these instruments attempt to make them renounce nuclear ambitions and how national policymakers try to cope with these external causal forces.

The main hypothesis (chapter 4) is the existence of a relevant and ill-addressed causal mechanism¹⁷ called the Middle Power Trap. This hypothetical construct permits to intertwine international social dynamics with the discussion about the role of international regimes. This causal mechanism illustrates, in this case, how nonproliferation mechanisms enabled great powers to play efforts to make emerging powers to abide by global norms and respect the existing world order like traditional middle powers - countries that normally avoid geopolitical quarrels and getting rewards for “good behavior”. Otherwise, emerging powers ran the risk of suffering diplomatic and economic sanctions, promoted by great powers, and being stigmatized by other peers. As discussed in chapter 4, I suggest the nonproliferation regime enacted “traps” set by great powers that hamper other countries to attain similar development in nuclear technologies – which have a dual purpose: peace and military.

¹⁶ It is worthwhile to mention this study operates in an asymmetric causal logic. In this sense, it does not apply a counterfactual test due to the ambitions of unpacking the reasoning of a given phenomenon that occurred in a group of states. Whether the causal mechanism unveiled during the research explains puzzles about other countries is a question to be addressed by further investigations. Some could claim systemic-level mechanisms might influence all states. But this analysis opted to reduce the assessed range of units to avoid biases triggered by factors that work in the international system, as such a network of alliances

¹⁷ Why is the Middle power Trap a causal mechanism and not an intervening variable? That is a relevant question. Whereas intervening variables are elements that values can vary in a causal chain, a mechanism occurs in the same frequency – it has nothing to do with probabilistic. Hence, scrutinized cases coped with the same systemic-level issue. As long as this research hinges on a set-theoretic logic, selected states share similar characteristics that avoid any questioning about the arguably different influence of the Middle power Trap. Even if a country provides a different solution to the problem sparked by this mechanism, it is not about its frequency - but local decisions and other lower-level-of-abstraction factors.

Although nonproliferation mechanisms (e.g., the NPT) promise to facilitate members' nuclear developments, it imposes many rules that obstruct national scientific initiatives and legitimizes NWSs' pressures against NNWSs (Chapter 5). Meanwhile, it also attempts to make countries diplomatically behave like traditional middle powers in the nuclear field. In so being, NWSs employ "direct" and "indirect" ways¹⁸ to address rebel cases. Whereas the former consists of actions targeting specifically the nuclear programs (e.g., atomic-related restrictions), the latter imposes losses to the country in other fields until it acquiesces to nuclear rules (e.g., economic sanctions). In this sense, the Middle Power Trap comprises the available systemic-level instruments that NWSs rely on to encourage NNWSs to adhere to the nonproliferation regime.

It explains the reason for calling this causal mechanism a "trap". Such a name is not a reference to the economic concept "middle-income trap" since this phenomenon occurs, according to the mainstream literature, mainly due to endogenous causal factors (e.g., demographic problems, poor macroeconomic policies, lack of necessary legal institutions) (AIYAR et al., 2013; EICHENGREEN; PARK; SHIN, 2013; FELIPE; ABDON; KUMAR, 2012). Great powers-led systemic instruments attempt to entrap rising countries into a position of subservient agents and, consequently, preserve stability. Both the subjective/ideational and materialistic enforcement mechanisms to sustain the international regime play crucial roles in accommodating grievances without disruptive quarrels against the world order (Zarakol 2010; Nexon and Neumann 2018; Smetana 2020; Saha 2022).

This process is enacted when a "transgressor" state goes against expected behavior and constitutes parts of this causal mechanism. In Chapter 5, this study explores such a causal chain to demonstrate how the nonproliferation regime represents a case where the Middle Power Trap can be attested due to the influence of great powers in its making process and legitimation of their acts. I delve into both the process of enacting and legitimation of the most important nonproliferation instrument (i.e., the NPT) that emerging regional powers complained to have left their voices unheard.

Two caveats: (1) it does not make countries become a traditional middle power¹⁹, but induces them to behave like one by respecting prescribed rules and pursuing, as an ultimate aim, "reputational assets" such as be socially grasped as "good and peaceful members". (2) This

¹⁸ I will address these two sets of instruments in chapter 4.

¹⁹ I am not claiming that mastering nuclear technologies is a sufficient condition to convince other countries about a peer deserves the great powers' status. This article assumes, according to the existing literature (GILADY, 2018; SAGAN, 1997), that this sort of dual-use technology is a valorized symbol of autonomy that can play an important role in this status-related dynamic.

hypothesis addresses a political phenomenon that involves mainly NWSs (agents that act to preserve the existing order) and emerging powers. Other countries (e.g., middle and small powers) play a minor role in this observed context (i.e., legitimizing the nonproliferation regime).

After unveiling the existence of the Middle Power Trap in the nonproliferation regime (chapter 5), it is relevant to assess how emerging regional powers cope with these pressures (chapters 6 and 7). Although the investigation to demonstrate the presence of this causal mechanism hinges on a deterministic causal logic – that is, the mechanism exists and exerts causal forces when activated, the results are probabilistic since they depend on states' conditions to manage this phenomenon. In this sense, I scrutinize the nuclear history of emerging regional powers to notice how conditions matter to interfere in the production of an expected outcome (e.g., abide by nonproliferation rules).

I pay particular attention to Brazil. This country represents a case where external pressures influenced the national nuclear policy towards abiding by nonproliferation instruments - notably, the NPT. It is a typical case for nonproliferation history. It held critical instances but acquiesced to nonproliferation instruments – similar to Egypt or Argentina. In methodological terms, Brazil represents a case (see George and Bennett 2005) that exemplifies outcomes observed in a larger population of countries. Yet, it is an emerging regional power; ergo, I look within its historical process to analyze how the Middle Power Trap convinced Brasília to emulate the path observed in other countries.

Although Brazil announced in 1987 the mastering of the uranium enrichment cycle via ultracentrifugation methods - at the laboratory scale, this state has never attained a full-fledged and self-sufficient program - as previously envisaged. Despite sustaining a critical position, it acquiesced to the nonproliferation mechanisms. The country needs to import enriched fuel from foreign institutions to supply the two national power plants – in 2021, the two national power plants ran almost without fuel during a national economic crisis. Likewise, the RMB project in the IPEN has never materialized, although scientists claimed it is vital to attain self-sufficiency in radioisotopes and radiopharmaceutical production to supply the SUS (Vicente 2023). Recent documents affirm the need to address institutional and financial hurdles to fulfill this autonomy on an industrial scale²⁰ and support innovation and technological progress – in which this country lags behind Iran and India. In conclusion, the existence of a robust governmental

²⁰ Brazil. Ministry of Economy. 2021. “Programa 2206 – Política Nuclear”. anexo-espelhosiop_politica-nuclear-7503714.pdf (www.gov.br)

mobilization to endorse a secret program (or parallel program) did not provide Brazil with nuclear autonomy²¹.

Key events happened during the Cold War. They revolved around the Brazilian policymaking context - on foreign policy and S&T - and the international regime. In this sense, I undertake a case study about Brazilian nuclear history employing inductive process tracing. However, I describe Indian nuclear history, too. Some experts on qualitative methods of research could complain about this choice. I took this decision because India represents an emerging regional power where the causal mechanism did not produce the expected outcome. New Delhi is a deviant case (an exception) – very few countries decided to go nuclear and avoided joining the main nonproliferation instruments²².

The US promoted the normalization of the Indian nuclear program by drawing the 2005 Nuclear Agreement with New Delhi without demanding prompt NPT adherence (see Saha 2022; Smetana 2020; Poggio Teixeira and Nicolini Gabriel 2022) – which was followed by other countries such as Australia and Japan. According to the literature, the causal forces related to the Middle Power Trap faced a robust response, during the Cold War, at the domestic level and it utterly failed to make India acquiesce to nonproliferation cornerstones like the NPT. Although the county established a diplomatic strategy to deny military-led interests in conducting nuclear tests in 1974 (calling this a Peaceful Nuclear Explosion) or to consider the 1998 tests a defensive action, New Delhi sustained many national initiatives to attain nuclear autonomy via mastering nuclear technologies and plutonium reprocessing techniques.

In so being, I justify the inclusion of India due to two reasons. Firstly, the purpose of this study is not to set a comparative analysis, but these two states joined the set emerging regional powers. The Indian case (a deviant case) works here to contrast the Brazilian case (typical case) with a country that share some important similarities in geopolitical terms. Despite their acknowledged differences, as will be demonstrated in chapter 2, they shared similar material and geological features and faced hurdles due to their ambitions to establish nuclear indigenous programs. These states refused to join NPT during the Cold War. As Wrobel

²¹ Some readers could claim the Parallel Program was the initiative to preserve national autonomy by hiding research from international surveillance. Likewise, it counted on the efforts of the military forces and consolidated the Navy's plan to assemble a nuclear-fueled submarine. Indeed, even the army and the air force attempted to establish their nuclear-related programs.

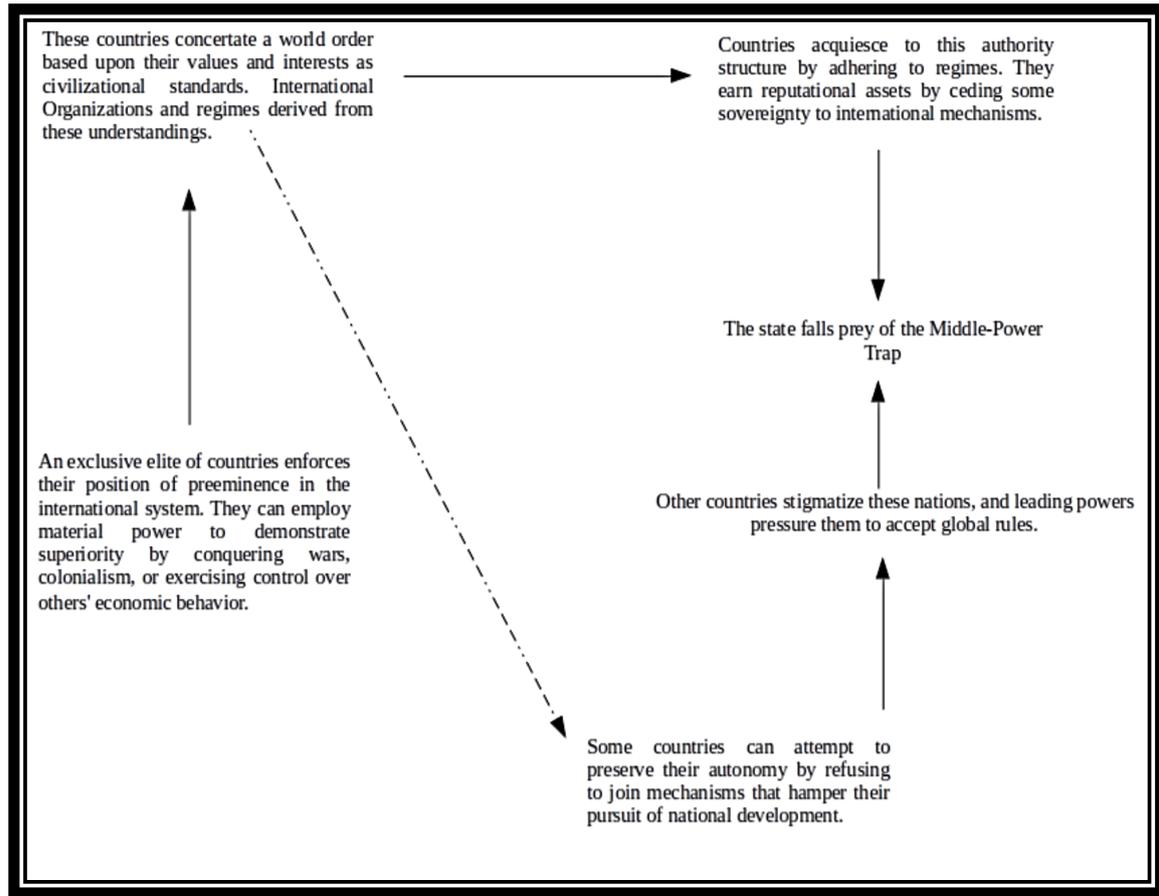
²² Only India, Pakistan, Israel, North Korea (denounced the treaty in 2003), and the newly independent country South Sudan remain outside the NPT. Israel could represent an interesting case to analyze, but it does not fit the characteristics of an emerging regional power (chapter 2). Another methodological reason to avoid assessing the Israeli case is that this country does not provide many sources to analyze the national nuclear program. Due to geopolitical reason, assessing this country is a time-consuming activity because it remains in a "grey zone" where it neither rejects the allegation of having an atomic arsenal nor assumes this information.

(1992) demonstrated, this social context encouraged others to deal with them as possible challengers to the world order. Since they were emerging regional powers endowed with reasonable industrial sophistication and natural sources of atomic material, it triggered suspicions among great powers over the reasoning behind their nuclear ambitions. As previous studies reported, the literature about how countries attempt to build their nuclear policies under international pressure is scarce in comparison to analyses of why states want atomic projects (NARANG, 2022).

Secondly, I apply a similar investigation logic observed in the classical book *Social Origins of Dictatorship and Democracy* by Barrington Moore Jr (see Moore 1966) – considering that this dissertation does not hinge on a cross-case research design. Although Moore sets a comparative analysis among states, he describes India as an exceptional case where democracy flourished despite facing many structural obstacles. In this sense, I think India could work as a contrast to the Brazilian case to demonstrate that results are probabilistic due to contextual elements – as previous literature on process tracing recommended emphasizing (FALLETI, 2016). As described in chapter 2, I am not arguing the same causal mechanism operate identically in both cases. Yet, the Indian case could reinforce some findings observed in the Brazilian nuclear history. In India (chapter 7), I do not undertake process tracing as a methodology. I only describe the case qualitatively via primary and secondary sources. So, India represents a shadow case related to the Middle Power Trap actions in the emerging regional powers and its inclusion can provide the reader greater confidence in the validity of the observed findings (chapter 2).

The described sections consist of the following parts of this dissertation. It is worthwhile to mention that each chapter ends with a small conclusion summarizing findings and discussions. In so being, I conclude this introduction by illustrating the macro context where locates this research in international relations. Image 1 depicts the critical narrative about how an exclusive group of countries, the great powers or the NWSs in nuclear-related terminology, hold sways over global negotiations and legitimate their actions against other countries that arguably menace the existing order. The dotted line represents the hypothetical situation addressed by this study.

Image 1 – This Study’s Macro Context in the International Relations.



Source: own elaboration

I will proceed with a broad introduction to each chapter to facilitate the reading:

Chapter 2 – Methodology. This section describes which are the documents analyzed and the adopted ways to overcome hurdles and assess historical material and primary sources. Readers might have imagined the considerable number of documents produced about nonproliferation during the analyzed period in the UN, great powers, and emerging regional powers. In this sense, this chapter describes the selection of sources to reduce eventual analytical biases and time-consuming activities. In addition, I explain the employed qualitative methodological procedures (e.g., the process tracing) and justify these choices – not only about the analytical techniques but also about the selection case. Likewise, this section presents the conceptualization of terms employed during this research.

Chapter 3 – Theoretical Debate. The third chapter investigates the IR literature about the role of international regimes in the development of emerging regional powers. I propose a reframing of the classical analytical model developed by Hasenclever, Mayer, and Rittberger (1997) that guides the existing literature about the meaning of international regimes in global affairs. Following similarly with their idea to define IR schools of thought on international regimes according to their perspectives on how and why these mechanisms exist, I come up

with new typologies that enable the systematization of critical knowledge over this subject. It orients the definition of the Middle Power Trap's theoretical features. In so being, I choose to apply the knowledge from the 'school of thought: imposed-idealistic', which comprises IR theories that argue social and cultural elements are also relevant to understand the hierarchy among states and how great powers hamper the consolidation of autonomy policies in other countries by legitimating the use of material assets against detractors.

Chapter 4 – The Middle Power Trap. In the fourth chapter, I tentatively build the main hypothesis of this research. I seeks to demonstrate the Middle Power Trap consists of legitimized instruments that great powers can employ to preserve the existing order and, thereby, hamper emerging powers from attaining the capacity to master cutting-edge nuclear technologies. The nonproliferation regime provided important examples of instruments to induces behavior and reduce international contestations. By assuming this status-seeking dimension, I claim NWSs actions to preserve and spread the nonproliferation regime affect negatively emerging powers' scientific developments to join the great powers' club. In methodological terms, this chapter describes each part of the mechanism and how they tie together to exert causal forces. In other words, this section introduces the hypothesis.

Chapter 5 – The Middle Power Trap and the Nonproliferation Regime. This section reported the investigation about the drawing of NPT and non-proliferation mechanisms from 1945 to 1970. During this period, the UN held many debates, and many countries engaged in different initiatives to raise their interests over nuclear policies. By qualitatively analyzing UNODA's volumes, I found evidence that attests to the special role granted to great powers in leading the initiatives to draw crucial mechanisms – notably the NPT. Secondly, I observed nonproliferation mechanisms legitimized NWSs' initiatives as robust responses to the demand for a halt of the nuclear arms race so that they could act against rival understandings by activating the Middle Power Trap. This exercise permits the refinement of the theoretical bases of the hypothesized causal mechanism. Likewise, it facilitates the case analyses by scrutinizing how Brazil and India worked to influence these negotiations via diplomatic instruments.

Chapters 6 and 7 – Cases Studies about Brazil and India. These two chapters depict the nuclear history of Brazil and India during the Cold War, respectively. Since India represents a case that ultimately refused to abide by nonproliferation pillars – notably, the NPT, I finish by telling its nuclear history (chapter 7). In the Brazilian case (chapter 6), I rely mostly on primary sources to understand how this country fell prey to the Middle Power Trap. During this investigation, I apply the process tracing to explain an already-known outcome.

Chapter 8 – Final Remarks. This chapter reports the conclusions, the importance of this study in fostering new research agendas about international regimes and nonproliferation, and its limitations. On the described findings, I summarize how the Middle Power Trap provides valuable insights into debates about how great powers rely on social legitimation to pressure other countries that challenge the existing understandings. Hence, I conclude that the nonproliferation regime can hamper the scientific development of emerging regional powers such as Brazil. The NWSs' efforts to preserve the nonproliferation regime affect the dispute for status by restricting access to some valorized assets and reducing the possibilities for other countries to attain the same level of technological development. I describe the “direct” and “indirect” ways employed by great powers to enforce or persuade (subjective assets) emerging regional powers into acquiescing to the nonproliferation rules.

Likewise, I shed light on how S&T policies are vital to understanding how emerging regional powers can cope with this causal mechanism. The reduced role of scientists and the lack of investments in S&T also represented a crucial variable to this subject - like foreign policy issues. Even if a state assumes a diplomatic instance that favors the right to develop studies to achieve nuclear autonomy, it is necessary to invest in centers that will conduct this research. Besides geopolitical aspects, the difference in how India and Brazil managed their nuclear scientific programs is crucial when analyzing their histories and outcomes. In this sense, I assume that investing in a concise long-term S&T policy to obtain nuclear autonomy and promote scientific progress in the country is a tool to face the Middle Power Trap.

2. METHODOLOGY

This research employs qualitative methods to address the puzzle. Bearing in mind that this dissertation's purpose is to suggest a possible role played by the nonproliferation regime in the observed outcome in the S&T development of countries like Brazil, this case-based research (see Beach and Pedersen 2019) works with IR scholarship debates and historical analyses to understand whether the hypothesized mechanism exists and how it works. Therefore, I decided to undertake qualitative techniques to find pieces of evidence that enable the draw of precise conclusions meanwhile forestalling any confirmation bias and context misunderstandings via literature review or archival research (BENNETT; CHECKEL, 2015; MAHONEY, 2012).

Since this is a historical-related study aimed at scrutinizing a causal chain, the methodological design has to consider four main challenges:

- Period selection. Contextual causal forces exert real influence over historical elements. As the IR literature has demonstrated (KUPCHAN, 2014), each world order responds to some features related to existing power dynamics between great powers. Likewise, each era of the international relations has different understandings about valorized assets and geopolitics. Selecting an appropriate time span to assess the development of emerging regional powers and the rise of nonproliferation instruments minimizes potential sources of bias.
- Case selection. Ensuring cases respond to similar factors is crucial since mechanisms are sensitive to contextual elements. Since I am investigating emerging regional powers, I define which qualitative features compose this term. In this sense, the reasons to delve into Brazilian nuclear history – and describe the Indian case – do not hinge on a cherry-picking case selection. Based on a literature review, I have to conceptualize the term emerging regional power to choose countries that operate in a similar logic within disputes for international status and power dynamics.
- Define the best manner to address the subject. Since this investigation focuses on the historical process that produced an outcome, selecting a qualitative method capable of capturing the essential details to rebuild the causal chain. Additionally, this research design requires an epistemological approach that employs findings to refine the hypothetical proposition.

- Managing the amount of sources. Because of the massive number of documents and secondary sources available, ensuring that my analysis focuses only on the most relevant empirical elements is necessary to avoid biases. In this sense, I looked for data-selecting techniques to reduce the amount of primary and secondary sources to a number I could manage. Likewise, I set some strategies to deal with a myriad of documents, like employing analytical software.

This chapter seeks to detail the proposed solutions for each topic, respectively. Readers can notice that I explain the necessary terminologies and how data were obtained. The purpose is to provide an in-depth description of the employed investigating tools to minimize potential doubts about how conclusions were taken. In the last section (chapter 2.5), I summarize the applied methodological design.

2.1. Historical period.

The analyzed time span is the Cold War (1947-1991). Nuclear technologies became an envisaged goal for scientists and policymaking due to their potential for enhancing economic growth and military capabilities (SPEKTOR, 2020). Many states considered setting up nuclear programs by hoping these cutting-edge technologies could provide benefits to their development (ASUELIME; ADEKOYE, 2016), despite knowing the potential threats to humankind. As depicted the US president Eisenhower during the 1953 speech Atoms for Peace at the UNGA, the Cold War was an atomic age:

The atomic age has moved forward at such a pace that every citizen of the world should have some comprehension, at least in comparative terms, of the extent of this development, of the utmost significance to every one of us. Clearly, if the peoples of the world are to conduct an intelligent search for peace, they must be armed with the significant facts of today's existence²³.

The Indian Prime Minister Nehru presented a similar argument in 1957:

In any event, whether we like it or not, it is quite inevitable that we do it, just as it became inevitable when the Industrial Revolution came to the world, that it should go ahead whether people liked it or not. So this Atomic Revolution, if I may call it so, has something in the nature of inevitability about it. Either you go ahead with it or you succumb and others go ahead, and you fall back and gradually drag yourself along in the trail of others²⁴.

Beyond the rise of nuclear technologies, the time span from 1947 to 1991 represents a period when disputes for influence and material power revolved around two defined

²³ United States. "Atoms for Peace" Proposal: Address by President Eisenhower to the General Assembly, December 8, 1953. In: UNODA. Documents on Disarmament 1945-1959. Volume I.

²⁴ Nehru, Jawaharlal. *Significance of the Atomic Revolution – Speech of Pandit Nehru at the opening of the Atomic Energy Establishment and naming of the first Swimming Pool Reactor, APSARA, at Trombay, Bombay, on January 20, 1957*. In: India. Department of Atomic Energy, "The Architects of Atomic Energy Programme in India". *Nuclear India*. Vol 43 (5-6). 2008.

geopolitical blocs. Theoretically, this moment reduces the influence of external causal forces derived from uncertainty over who were the great powers. Some analysts could suggest the inclusion of other historical moments to establish temporal comparisons within cases. Yet, the purpose of this study is to advance discussions about a specific mechanism that operates in a given context (make emerging regional powers abide by rules via incentives from NWSs). Crucial events happened during the Cold War (GADDIS, 2006). Thus, I investigate the historical roots to understand the current nuclear landscape.

This research design preferred to reduce the range of “external validity” to robust the explanatory force. Since the nuclear history of Brazil – and India – were consolidated during the Cold War, I judge this is the perfect period to dig into this subject. Future studies can analyze its generalizable degree during other periods. Furthermore, this well-defined structural dispute helped to control some exogenous elements. For instance, the selected cases did not enjoy official endorsement from these great powers in terms of nuclear aspirations.

2.2. Case selection

In this type of research, it is crucial to ensure that cases respond to similar factors since mechanisms are sensitive to contextual elements (BEACH; PEDERSEN, 2018). To do so, this selection of cases considered contextual factors when global authorities introduced the idea and negotiated the NPT (1945-1968). It captures essential characteristics to describe who were emerging regional powers ex-ante the entry into force of a system that legitimated great powers to set up robust regulating instruments²⁵. Thus, the operationalization of concepts seeks to avoid biases by refining the definitions of the scrutinized set. For example, a nuclear policy from a small *pariah*²⁶ country would probably face different challenges and would count on less available resources than an emerging regional power. This study reviewed the IR literature about the social hierarchy among states²⁷ (HARKAVY, 1981). Since measuring (objectively) international status is still an unresolved question (DE CARVALHO, 2020; LAKE, 2011;

²⁵ The only ex-post characteristic observed, during the research, is whether a state signed the NPT during the Cold War.

²⁶ The idea of *pariah* is relevant to this study. Since it works with subjective causal factors and the stigmatization of interests, the term *pariah* means states that face diplomatic isolation. In other words, when countries are suspended from the UN or excluded from international forums.

²⁷ It does not mean this research excluded strands that reinforced the existence of international anarchy where all states are equally sovereign. For instance, defensive neorealists fiercely advocate for the presence of such analytical dispositions. But they did not challenge the existence of differences in the balance of power and, thereby, stronger countries develop specific roles in the system (WALTZ, 2010).

RENSHON, 2017; WARD, 2020), concepts related to this area are broad and vaguely defined (STUENKEL, 2016; YILMAZ, 2017).

A trivial definition for emerging power is: a state that claims a more considerable role in global politics by requiring that international mechanisms take into consideration their interests and perspectives (MARES; TRINKUNAS, 2016). Despite realist' and power transition theory's assumptions, emerging powers are not necessarily revisionist agents prone to start a war against great powers (BROOKS; WOHLFORTH, 2015; LEMKE; TAMMEN, 2003; MEARSHEIMER, 2001; SCHWELLER, 1994). They are not "rule makers". Nevertheless, they seek changes in the existing order and accommodation of their ambitions (LARSON; PAUL; WOHLFORTH, 2014). In this sense, these states are not widely considered legitimate actors to promote *per se* reforms in the global order. However, they are countries where it is noticeable a positive change in their military forces, GDP, and scientific development (Mares and Trinkunas 2016).

What's more, these states are not traditional middle powers (COOPER; HIGGOTT; NOSSAL, 1993) because they valorized their rights to develop autonomous policy regardless of the principles legitimated previously by great powers (WARD, 2017). Such an affirmative about traditional middle powers' behavior calls "middlepowermanship" (COX, 1989) and received some criticism within the IR scholarship (JORDAAN, 2017; NOLTE, 2010). Yet, it helps to differentiate these countries from emerging powers²⁸. Traditional middle powers make multilateralism their natural option to resolve diplomatic issues (FLEMES, 2007; JORDAAN, 2017) and attempt to earn reputational assets like "good citizens" that respect rules (CASARÕES, 2020). Although middle power can hold sway over regional instances (Cooper 2011; Cooper 2016; Guimarães and Tavares de Almeida 2017), these countries usually avoid taking assertive measures against the influence of higher stratum.

In other words, whereas emerging powers are not passive actors in international affairs, traditional middle powers often accept existing rules (ABBONDANZA; WILKINS, 2022; KHANNA, 2008; STUENKEL; TAYLOR, 2015; WILKINS; REZENDE, 2022). Unlike small powers (Schia and Sending 2014), emerging powers hold considerable material capabilities to

²⁸ It is a relevant element. The term traditional middle power maintained the normative feature of peaceful countries that seek to preserve order. An emerging power, on the opposite, does not strive to protect the status quo. It is often a reformist state. The latter emerges in terms of power and, thereby, attempts to safeguard its interests. Such as realist strands emphasized, these countries do not need to enjoy the status of "good members" (Schweller 1994; Walt 2010) or Global South freedom fighters. Moralism is not a necessary condition to imply that a country is an emerging regional power.

safeguard their sovereignty and dispose of diplomatic assets to join multiple discussions within organizations, such as the UN (LOPES; CASARÕES; GAMA, 2020; TOURINHO, 2021).

Policymakers and pundits usually claim that a myriad of states could be named emerging power (STUENKEL, 2018; ZAKARIA, 2013). However, such a perception does not hang onto rigorous scientific backgrounds. The concept of emerging power lacks the distinctness required to enable valid comparisons (COLLIER; GERRING, 2009; SARTORI, 1970). For instance, a growing body of literature has made explicit the difficult to label these states by calling them “awkward powers” (see Abbondanza and Wilkins 2022; Wilkins and Rezende 2022).

In light of this, selecting a case is perhaps among the most complex decisions to be taken. This study decided to apply the term emerging regional power instead of the traditional concepts of emerging power. The benefits of this decision gravitate over the inclusion of the regional dimension into the terminology. It reduces the number of available cases in the set and makes the analyzed case more concise. Traditional elements about emerging powers incorporate another feature related to the material capabilities of a country vis-à-vis neighbors without looking at which sort of relationship it maintains with others (DESTRADI, 2010; WIGHT, 2002).

Although previous works advocated that regional powers are legitimate leadership inside their neighborhood (Hirst 2019; Montenegro and Mesquita 2017; Nolte 2010), this study adopts a different understanding to avoid controversial topics in the IR realm. The rise of the material power of a country tends to cause dread in others. Regional rivalry is an acknowledged situation in international relations (BUZAN et al., 2003; MCGINNIS, 1990; VAN EVERA, 2013; WALT, 1988). It would be problematic to call a state an emerging regional power. This affirmative, for instance, would hamper the claim that India or Brazil were members of this set due to their thorny ties with Pakistan and Argentina during the Cold War. This research assumed that if a country is much stronger than other regional peers are and the latter cannot balance power against the former, it can be a regional power regardless social identity of a local “bully”. Their policy to earn normative assets to legitimate their actions can address states from different regions.

In conclusion, there are three features to define whether a country is an emerging regional power: (a) its superiority on material capabilities vis-à-vis neighboring states. Such a

feature does not take into consideration the possible presence of a great power²⁹ – which are excluded from this section. This study applies Buzan and Waever’s description (2003) about patterns of regional security during the Cold War³⁰. Their explanatory model enables investigations about the regional powers in terms of material capabilities³¹. There are five consolidated complexes: South American, Southern Africa, Asian supercomplex, North American, and Middle Eastern. (b) Diplomatic attempts to convey their interests beyond its regions. This context refers to countries that developed outward foreign policies to address global issues. For example, these states work inside international forums to protect their interests. They cannot be considered officially a *pariah* by the lion’s share of great powers because these states might be able to join discussions about topics such as non-proliferation.

Finally, (c) the refusal to accept rules that go against their ambitions to pursue valorized assets such nuclear technology. The search for prestige might not respect rules that discourage their efforts to achieve similar status of great powers³² (Ward 2017). Since they are endowed with natural resources³³ and diplomatic assets, these countries could attempt to achieve envisaged outcomes autonomously. In addition, these countries could not join great powers’ military alliances (e.g., NATO or Warsaw Pact) or strong nonproliferation organizations provided with inspections instructions (e.g., Euratom). They have to enjoy autonomy in their technological- and military-related policies. Their strategies cannot be tied to great powers’ understanding in a way that compromises their sovereignty over this issue.

²⁹ During the case selection, great powers are synonym of UNSC permanent members who are also the nuclear states according to the NPT. This issue has only one controversial outcome: the case of People’s Republic of China. This state became a veto player in the UNSC only after the approval of UNGA Resolution 2758, in 1971, that transferred the institutional seat to Beijing (see A/RES/2758 (XXVI)). Despite an existing literature that considers this country an emerging power, it holds special assets granted only to great powers, such as the status of NWS. Likewise, the only Chinese government to produce a bomb and establish a robust nuclear policy was Beijing. Thus, it is considered a member of this special club.

³⁰ The employment of this model is strictly linked to methodological purposes. It divides the world into regional zones based upon material-led variables. Although I do not apply the neorealism’s lenses to analyze the subject, it is not reasonable to avoid completely the inclusion of material power as a dimension of this concept. Military strength is not a sufficient condition to be considered an emerging regional power.

³¹ This work considered only the regions named as complex of security. There are two areas in Africa called pre- or proto-complex. Both of them lack the necessary conditions to be a full-fledged regional complex. Either did they have not achieved cross-linkages among the units or their states were too weak (see Buzan and Waever 2003). About Asia and Oceania, this study opted to analyze completely Asian supercomplex.

³² That is why many authors presume that Global South countries are more prone to assume the role of emerging regional powers. They are naturally more independent in terms of drawing their strategies. However, there are acknowledged cases (e.g., France and China), members of geopolitical blocs (Western and Soviet), that refused requirements to forsake their military ambitions.

³³ On national autonomy, it is worthwhile to mention that these countries have reserves of raw material to conduct nuclear policies (see Patti 2012).

For example, Cuba and Turkey were under pressure to avoid installing nuclear warheads inside their territory after the 1962 Missile Crisis³⁴ (Kissinger 1994). Likewise, the existence of Euratom³⁵ served to build control rules that encouraged members to sign the NPT during the 1970 (MALLARD, 2014; MÜLLER, 2019). In addition, after WWII, some states have been harshly scrutinized by international mechanisms. The international community imposed severe restrictions on West Germany and Japan in terms of military expenditure. For example, the Treaty of Paris (1954) banned the development of nuclear arms in the West Germany and set limits on its enrichment of uranium. Other countries, like Hungary, Bulgaria and Finland, acquiesced to the commitment of not building nuclear weapons to obtain peace treaties during the Cold War³⁶.

An emerging regional power must have these three dimensions. This analytical set derives from a Boolean logic “and”; that is, inside the scrutinized grouping are countries with “condition (a) “and” condition (b) “and” condition (c)” (Beach and Rohlfing 2018). Furthermore, this case selection applies some qualitative hypothesis tests to refine the process. This study, therefore, began the case selection by coding countries into three categories derived from the articles of the NPT (see Annex 3): (1) NWS, the only five great powers that built and tested nuclear artifacts before January 1967³⁷; (2) NNWS, all other parts; and (3) countries that did not join the treaty. It culled members of the (3) by proceeding with a qualitative analysis of UN records about when countries adhered to the NPT. Table 1 depicted this phase that could be considered a sort of “straw-in-the-wind” test³⁸. According to the IR literature, this analysis considered states that could have established nuclear policies during the Cold War (Asuelime and Adekoye 2016).

³⁴ This event triggered a tense political standoff between Washington and Moscow. Such states relied on these defensive umbrellas, so they avoided diplomatic skirmishes.

³⁵ Since tensions between Euratom and international nonproliferation mechanism were solved, these structures worked together.

³⁶ See U.S. Congress. Subcommittees on International Security and Scientific Affairs and on International Economic Policy and Trade. The International Atomic Energy and Agency (IAEA): Improving Safeguards. (18th March, 1982).

³⁷ The United States, the Soviet Union, the United Kingdom, France, and China.

³⁸ It is a weak test to reaffirm the relevance of these cases (COLLIER, 2011). It does not prove if a country is an emerging regional power but emphasizes that it pursued an autonomous instance over nuclear issues and challenged the international regime.

Table 1 - States and NPT ratification during the Cold War

Name/Variables	NWS	NPT ratification
Argentina	-----	-----
Australia	-----	1973
Belgium	-----	1975
Brazil	-----	-----
Canada	-----	1969
China	X	-----
Egypt	-----	1981
France	X	-----
West Germany	-----	1975
India	-----	-----
Indonesia	-----	1979
Iran	-----	1970
Israel	-----	-----
Italy	-----	1975
Japan	-----	1976
Libya	-----	1975
North Korea	-----	1985
South Korea	-----	1975
Mexico	-----	1969
Netherlands	-----	1975
Pakistan	-----	-----
Philippines	-----	1972
South Africa	-----	-----
Soviet Union	X	1970
Sweden	-----	1970
Switzerland	-----	1977
Turkey	-----	1980
United States	X	1970
United Kingdom	X	1968
Yugoslavia	-----	1970
Vietnam	-----	1982

Source: own elaboration

It is crucial to tackling an issue observed in the literature. Some countries adhered to the NPT but arguably maintained nuclear ambitions by acquiring gas centrifuges secretly - to name some cases: Algeria, Libya, Indonesia, Iraq, and Iran (BAHGAT, 2008; PATTI, 2012; SIRACUSA; WARREN, 2018; WAY; WEEKS, 2014). Yet, these states did not officially develop atomic weapons during the scrutinized period. In addition, their supposed attempts to sustain these policies would not necessarily turn them into available units to analyze due to the employed Boolean logic.

In this sense, rested only six cases: Argentina, Brazil, India, Israel, Pakistan, and South Africa. These states are geographically divided into 4 regions: 2 in the South American complex

(Argentina and Brazil), 2 in the Asian supercomplex (India and Pakistan), 1 in the Middle Eastern complex (Israel), and 1 in the Southern African complex (South Africa). Therefore, it is crucial to assess their features to understand whether these countries are emerging regional powers. Firstly, their regions are analyzed according to the CoW index CINC³⁹. If these countries are the strongest (have the highest score), they passed in this hoop test⁴⁰.

It is relevant to emphasize this process of independence because many of these states did not dispose of bureaucratic mechanisms and resources to enhance national capabilities. Nevertheless, some of these countries gained independence and assumed leadership roles or mobilized military assets quickly because of historical, institutional, or political factors (ACEMOGLU; ROBINSON, 2008; PRZEWORSKI et al., 2000; PRZEWORSKI; LIMONGI; GINER, 1995). A similar phenomenon that occurred in Africa was observed in the Middle East and East Asia. An array of local sovereign states joined the world order during the Cold War (HUNTINGTON, 1991). This late wave of independence sparked new dynamics and revamped rivalries among states. Among the most acknowledged⁴¹ cases are India (1947), Pakistan (1947), China (1949), and the two Koreas in 1948 (HOBSBAWM, 1995). According to graph 3⁴², India was stronger than other neighbors were - including Pakistan. Therefore, only the former passed in the test. In the graph 4 about the Middle Eastern, Israel did not present the highest score of material capabilities. Countries like Egypt, Iran, Morocco, and Turkey had material-led capabilities. Thus, it failed to achieve this dimension of emerging regional power.

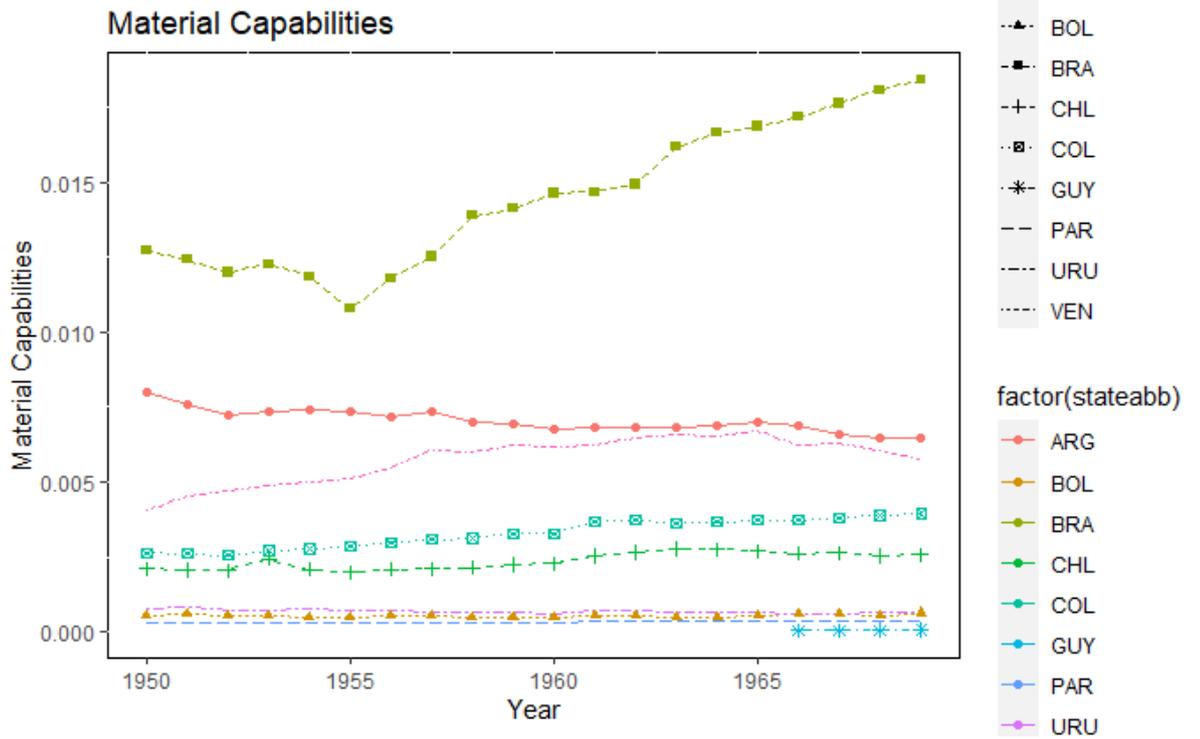
Graph 1 – Material Capabilities in South America

³⁹ Critics about the use of CINC to measure power in regional issues are acknowledged, but many of them revolved around periods after the Cold War (SCHENONI; MALAMUD, 2021). It is not the purpose to discuss such literature, but CINC plays the role of selection cases according to their material capabilities. It is not the only dimension assessed to claim if a country is an emerging regional power. Thus, such an index serves as a proxy.

⁴⁰ This is a hypothesis test employed to analyze claims made via process tracing. Hence, the hypothesis “this country is an emerging regional power” must jump through the hoop to attest the presence of all necessary conditions (Collier 2011).

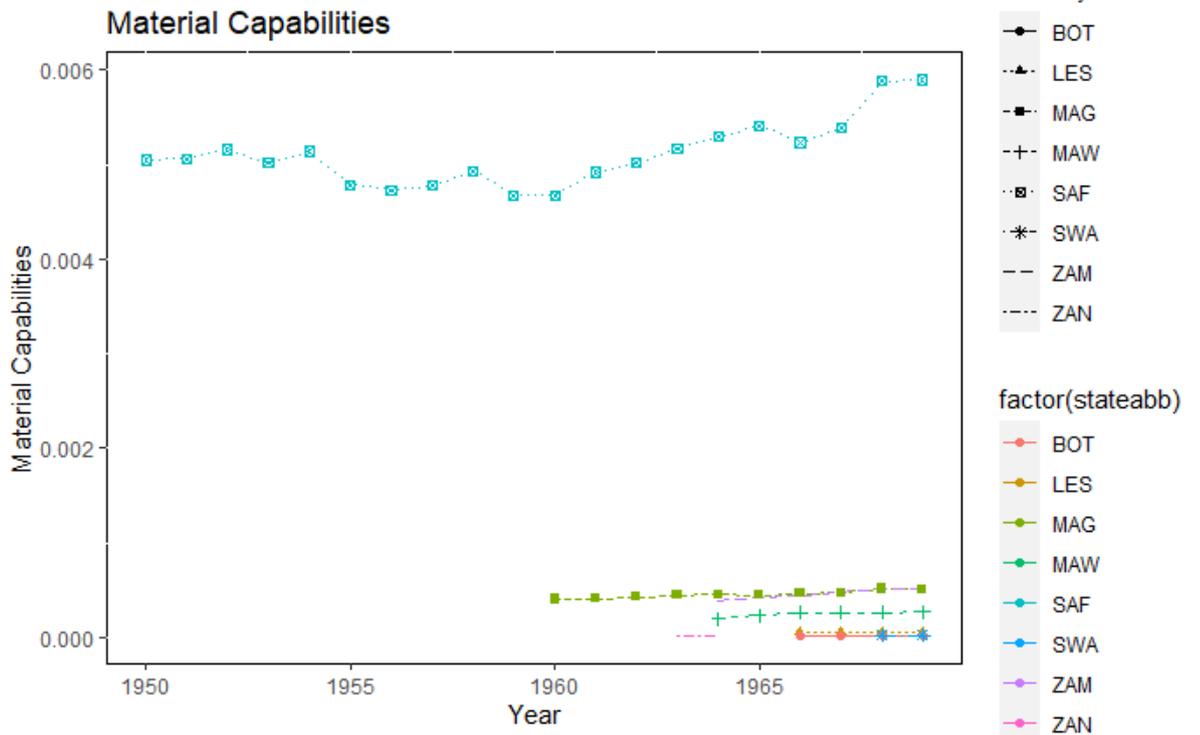
⁴¹ Other Independence dates in Asia during the Cold War: Bahrain (1971), Bangladesh (1971), Brunei (1984), Cambodia (1989), Jordan (1946), Laos (1953), Malaysia (1963), Maldives (1965), Myanmar (1948), Oman (1956), Philippines (1946), Singapore (1965), Sri Lanka (1948), United Arab Emirates (1971), South Yemen (1967), and the Geneva Conference recognition of Vietnam (1954). Independence of other members of Middle Eastern: Algeria (1962), Egyptian Revolution (1953), Tunisia (1956), and Morocco (1956).

⁴² It is worthwhile to mention that these graphs were plotted using the software R Studio. Despite regions (Middle East and Asia) consisted of many countries, the software chooses only some relevant cases to show. However, these results give a sense of the balance of power in each area. Likewise, in Asia, this study did not consider data about China because this country is a great power.

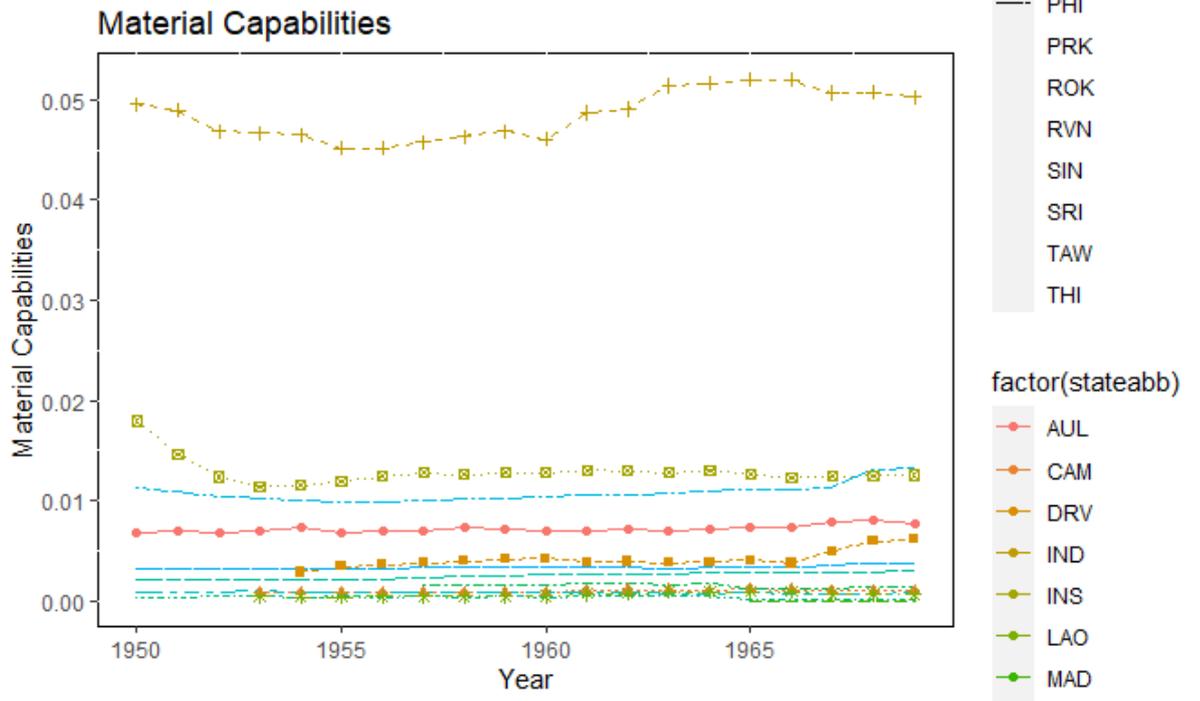


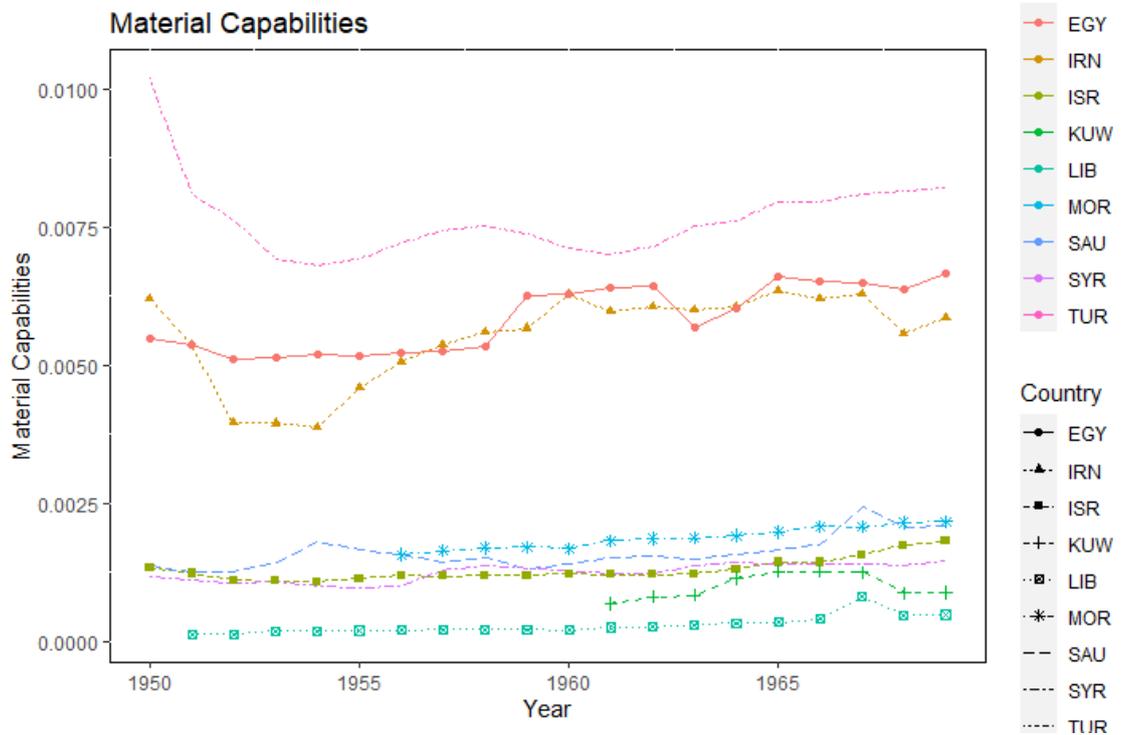
Source: own elaboration

Graph 2 – Material Capabilities in Southern Africa



Graph 3 – Material Capabilities in the Asian supercomplex



Graph 4 – Material capabilities in the Middle East

Sources: own elaboration

Brazil, South Africa, and India were the only cases to pass in this test. The next section focused on these three states and their diplomatic role inside international system – condition (b). This phase employs analytical efforts based upon qualitative and quantitative data. Firstly, applying historical elements, these cases were assessed whether they were members of UN, joined international mechanisms, and received diplomatic recognition from the lion's share of great powers during the period of the establishing of nonproliferation regime, from 1945 to 1968. These states have to be recognized as sovereign states eligible to have a seat in UN organisms and develop diplomatic actions beyond their regions.

Brazil and India represented typical cases that assumed a prominent role in these discussions and performed sophisticated diplomatic actions to counterpoint great powers' ambitions over this field (CARRANZA, 2017; STUENKEL, 2019). Both joined world order-building events, such as the Conferences of Bretton Woods (1944), and were among the UN's

founding members⁴³. There is an extensive literature about their contributions to specific agencies and regularly election to an UNSC's non-permanent membership (DE SEIXAS CORRÊA, 2013; GORMAN, 2014; LOPES; CASARÕES; GAMA, 2020; NARLIKAR, 2011; SHERWOOD, 1996). Whereas Brazilian foreign policy incorporated the idea of a “manifest destiny” claiming this country was bounded to become a great power, India conveyed the image of moral non-aligned leadership against colonialism, racism, and social inequalities (Abraham 2008; Ayres 2017; Gupta and Shukla 2009; Kennedy 2015; Malone 2011; Singh 2018). What's more, Brazilian and Indian diplomats, since the very beginning of the post-WWII order, played important roles on international negotiations. Brazil's diplomat Oswaldo Aranha, for example, chaired the UNGA section that voted the Resolution 181 that terminate the British mandate for Palestine in 1948 (A/RES/181)⁴⁴. The Indian agent Sir. Ramaswamy Mudaliar served as the first president of the UNESCO in 1945.

Many readers would correctly raise some doubts about apartheid-led South Africa (1948-1991). Apartheid government coped with severe diplomatic quarrels against states like India or international coalitions. South African embassies in its continent were shut down in 1960 (CHRISTOPHER, 1994) and UNGA recommended the application of specific measures against this state⁴⁵ (see A/Res/1663(XVI)). Although Pretoria became officially a *pariah* during the mid-1970s, it faced many diplomatic skirmishes due to the erstwhile existing racist policies. It was suspended from the UN in 1974 and excluded from the Olympic Committee in 1970 (CRAWFORD; KLOTZ, 1999). The Apartheid Convention that considered this segregationist regime a crime against humanity received the endorsement of the UNSC in 1984⁴⁶ (see SC/Res/556). Previously, this state received endorsement from Western countries. It also set a diplomatic offensive to strength ties with European countries, Malawi, Rhodesia, Asian countries (e.g., Israel, Taiwan, Lebanon, and Iran), and Latin American dictatorships such Argentina, Brazil, Paraguay, and Chile (CHRISTOPHER, 1994; KANNYO, 1982; PATTI, 2018). Great powers (e.g., United Kingdom and the United States) lately imposed arms embargos to end of military sales (MORAES, 2021), and set a diplomatic isolation of South

⁴³ South Africa was another example of country who did the same. India, during this moment, was not a sovereign state. Yet it signed the Declaration by United Nations in 1942. In a similar position, the UN accepted, in 1945, the presence of Ukraine and Belarus. Both were autonomous regions in the Soviet Union.

⁴⁴ To understand these UN symbols about document identifications, see (Annex 4).

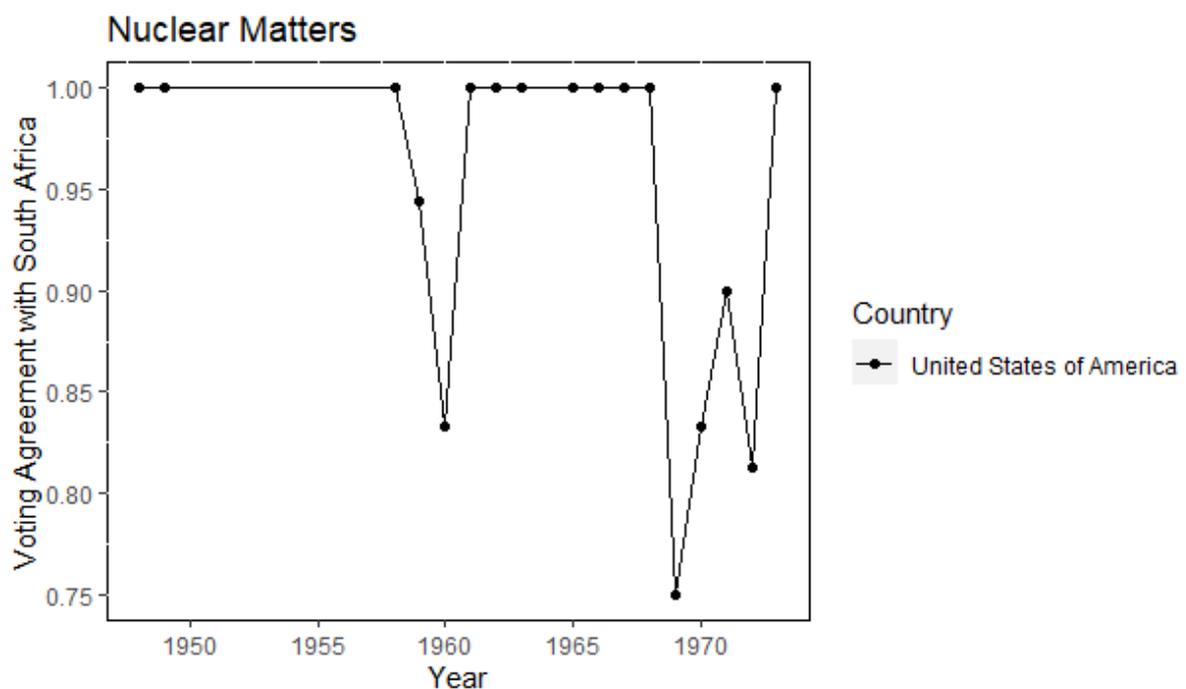
⁴⁵ In 1961, the Prime Minister of South Africa H.F. Verwoerd also complained against these diplomatic initiatives to put an end to the South African racial segregationist policy.

⁴⁶ UNGA adopted this resolution in 1973, but faced the opposition of Portugal, the United States, and the United Kingdom.

Africa only after the negotiation of the NPT. Such a context could generate some biases and invalidate the inferences.

South Africa was not invited to always join exclusive UN nonproliferation initiatives (e.g., ENCD), although it was an IAEA member. Although there were moments of dissonance between Pretoria and Washington, graph 5 demonstrate that these countries shared close positions. This graph is based upon the UN voting database of Voeten and Merdzanovic (2009). From a complete agreement, some periods, like when the NPT was voted and agents discussed the ban of nuclear technology in Africa, unpacked certain quarrels between these two states. Unlike the other cases, the apartheid government sought to gain admission to the exclusive normative club of First World and it established an alliance with Portugal and nuclear partnerships with Israel - regardless of the disapproval of great powers (LIBERMAN, 2004; RABINOWITZ; MILLER, 2015). Global South countries, such as Brazil and India, usually disagreed with United States in S&T topics. Their policymakers draw actions to face the influence of Western bloc in different fields. Conversely, Pretoria aimed to endorse this bloc (EDWARDS; HECHT, 2010) to establish closer ties due to historical, racial, and security-led factors (ONSLow, 2009; VAN NIEUWKERK, 2006; VAN WYK, 2007).

Graph 5 – Voting convergence between the United States and South Africa in nuclear matters



Source: Own elaboration

Therefore, Brazil and India were undeniable cases that obtained this diplomatic dimension of active members within international dynamics. South Africa, however, faced many issues and it was not able to pass the test with the “lowest score possible”. Hence, only Brazil and India kept inside the analyzed set. The last test aims to investigate if they did not have any diplomatic constraint to develop an indigenous nuclear policy, for example joining a robust military alliance cored in great powers that took over decisions about this topic.

Neither did these countries join these mechanisms, nor did they ally with great powers that directly held sway over their nuclear policies. During the scrutinized period, Western countries required India to avoid using technologies from cooperative agencies to conduct atomic tests (PERKOVICH, 2001). Indian close ties with the Soviet Union encouraged these countries to sign, some years later, the Indo-Soviet Treaty of Peace, Friendship, and Cooperation in 1971⁴⁷. Although it involved technological and security issues, India did not relinquish nuclear ambitions. Brazil, in this sense, signed the Treaty for the Prohibition of Nuclear Weapons in Latin America and the Caribbean (Treaty of Tlatelolco) in 1967 (Brazil 1994). However, it refused to waive some conditions to internalize the treaty into national legislation until the end of the Cold War – when countries like Cuba and Guyana accepted to adhere to the treaty.

In addition, the Brazilian government only accepted the authority of OPANAL in 1994 and established robust safeguards agreements with IAEA in 1991 (in accordance with the Tlatelolco Treaty) (Patti 2012). This country strived to safeguard the right of conducting atomic peaceful tests regardless of the protest of other Latin American states such as Mexico (Spektor 2020). Although Brazil joined the Rio Pact, in 1947, aimed to establish a reciprocal assistance area inside Americas, it cannot be considered a robust system of alliances⁴⁸ and did not represent a real hurdle to the idea of an autonomous nuclear program.

Hence, these two cases were selected. All were considered threats to global peace, during the Cold War, due to their nuclear ambitions (CARPES, 2013). In other words, great powers employed efforts to stigmatize their foreign policies. This is a kind of “straw-in-the-wind test”. It increases confidence in the existence of a structural mechanism to constrain such rebel

⁴⁷ Article II of this agreement is a voluntary commitment to strengthen peace by claiming against arms races, including nuclear and conventional, and requiring international accountability. But it did not develop an enforcement structure to bind these states with treaties and regimes (see India 1971).

⁴⁸ See the case of Malvinas/Falkland Islands War (1982) when the United States refused the suggestion of other American countries to enact this treaty to deal with the arguably aggressive position of the United Kingdom. Hence, the efficiency of this treaty is questionable.

behavior against prescribed rules. Although this set (emerging regional powers) is composed of states with different national configurations, these cases are similar in their international standing in the world order. The following section describes the methodology applied to analyze information and test propositions.

2.3. Methods of Analysis

This study employs process tracing as a method of analysis to investigate the causal chain where forces attempt to make emerging regional powers abide by nonproliferation mechanisms and, consequently, abdicate ambitions in the realm of S&T. Since this group of cases was previously selected, it is possible to learn from observations about the challenges these states cope with when trying to catch up with technological standards against the will of great powers (Zarakol 2010). In this sense, this historical investigation can provide valuable insights into the discussion about the role played by an international regime in the development of emerging regional powers because it supplies critical perspectives with detailed information to refine its hypothetical explanations.

I start, firstly, explaining the reasons behind choosing process tracing. Firstly, this method fits the epistemological logic applied in this research design. Since I know the outcomes, this study needs to undertake a backward-looking analysis to assess the possible correlation between the nonproliferation regime (X) and the hurdles imposed on the S&T policies in the analyzed context (Y). There is a considerable Social Science literature about the use of process tracing to proceed with research designs that require in-depth investigations interested in unveil mechanisms that produced an acknowledged outcome (BEACH, 2017a; BEACH; PEDERSEN, 2019; BENNETT, 2010; COLLIER, 2011; MAHONEY, 2015; TANNENWALD, 2015). This method facilitates analysis seeking to detail whether and how a causal force could have attempted to induce an agent to follow an expected path.

Secondly, a qualitative research design enables an intensive investigation (ELMAN; GERRING; MAHONEY, 2016) about primary sources from the UN and these countries to understand their perspective and relation with the nonproliferation regime. Previous authors have used this method to assess how international actors reacted to restrictive international dynamics. I advocate for the employment of process tracing because it provides evidence of the existence of the Middle Power Trap. The ultimate aim of this method is to unpack causal mechanisms (BEACH, 2017b; BENNETT, 2010). Thus, this method is a sophisticated technique to better place the Middle Power Trap into a causal claim. This mechanism is a

NWSs' systemic-level set of instruments that requires a qualitative approach to unveil its characteristics and the outcomes sparked by its activation.

In conclusion, process tracing is useful for the purpose of this study because it provides an in-depth assessment of the elements and links between them that compose a causal chain that resulted in an observed outcome. Likewise, the purpose of this dissertation is to refine a hypothesis (conceived as a causal mechanism) that explains an outcome observed in the analyzed context. The literature on methodology usually suggests that process tracing is the ideal instrument to address this sort of research design. However, this leaves three questions open: (a) which approach would I apply to delve into the cases (inductive or deductive)? (b) How can I address these two cases? (c) How can I cope with a myriad of available sources and avoid analytical biases and time-consuming activities?

This dissertation employs an inductive logic. By applying this bottom-up initiative, I can assess how the diplomatic process of establishing the nonproliferation cornerstones (e.g., NPT) evidences the unequal power dynamics among states and, consequently, reinforces the hypothesis that these regulating mechanisms can work in favor of NWSs to underpin the status-quo. Similarly, it permits me to dig into how emerging regional powers coped with these external forces in their S&T-related policies to attain nuclear autonomy. The inductive process supplies the hypothetical assumption about the Middle Power Trap with empirical pieces of evidence. Yet, I limited the employment of process tracing to the analysis of the history of the nonproliferation regime and regulating instruments and the Brazilian case. This context can potentially depict the Middle Power Trap's existence and influence over emerging regional powers' nuclear programs.

The Indian case is an exception to the nonproliferation field. Hence, I will describe this history. It means I can rely on some secondary sources more freely and pinpoint details to demonstrate how New Delhi dealt with external pressures. This country works to confirm some pieces of evidence – e.g., which instruments these states could rely on to face the Middle Power Trap or the lack of room in multilateral negotiations vis-à-vis great powers. It also reinforces the existence of the causal mechanism and the premise that results depend on domestic capabilities to respond to foreign forces.

In light of this, this dissertation assesses sources according to this following proposed research strategy. Firstly, I analyze documents that can contribute to grasping how the Middle Power Trap comes into being. Chapter 5 investigates how great powers influenced global

decisions to regulate the nuclear field by employing normative and material assets. Likewise, it unveils how NWSs legitimize these instruments to punish challenging understandings. In Chapter 6, I describe how NWSs can rely on nonproliferation instruments to exert causal forces to pressure emerging regional powers (e.g., Brazil) to abide by the regime and restrain their nuclear ambitions.

2.4. Managing the amount of sources.

This study gives preference to primary sources over secondary sources. As primary sources, I consider two broad clusters: written historical documents and interviews. I address the latter via archival research by relying on the software Atlas.ti to handle the myriad of documents that requires a qualitative analysis. This cluster comprises telegrams, reports, speeches, statements, resolutions, oral history, transcriptions of voting justifications in multilateral negotiations, UN archives, and any other official document produced by a policymaker or nonproliferation instrument related to the topic and presented in the analyzed archives. I consulted the following archives: Wilson Center, the CNEN archive, CIA declassified archives, Eletrobras Memory of Electricity archive, the National Security Archive, the United States National Archive, the Manohar Parrikar Institute for Defense Studies and Analyses Digital Archive, the Brazilian Senate Archive, the IAEA Digital Archive, and the CPDOC-FGV archive. Documents from CNEN and Eletrobras were obtained through formal requisitions to their archive. It was necessary to fill a formulary in their official websites and wait for an administrative answer. Hence, some documents cannot be reproduced without formal authorization.

I explored sources compiled by the United States Arms Control and Disarmament Agency in volumes available on the UNODA's website. They provided 2,195 official documents issued by states and organizations during debates about nonproliferation and disarmament from 1945 to 1970 at the UN. These volumes are organized by year and written in English regardless of the country's original language. It facilitates the treatment of data. In this sense, I can attest these archives gave me a substantial amount of primary sources to analyze the subject. These documents provide the findings employed to write chapter 5⁴⁹.

Another primary source is the semi-structured interviews conducted with scholars, practitioners from the nuclear area, diplomats, and former policymakers. I interviewed 20

⁴⁹ A piece of last information about primary sources. I realized that many Brazilian students face challenges to find or use primary sources about nuclear issues – mainly when dealing with foreign countries. I will detail, in the conclusion chapter (chapter 8), some impressions that I had by coming across these methodological questions. I aim to provide tips for future research in order to facilitate the analytical process.

agents (Annex 5) who could contribute to enriching this dissertation with valuable information. These interviews provide information to triangulate sources with analyzed documents and detail historical events by providing *in loco* perspective about nuclear-related issues. I conducted interviews by sending a questionnaire with open-ended questions and/or scheduling videoconference meetings – a more convenient way to do so during the pandemic times. Likewise, this dissertation prioritized Brazilian agents due to the methodological interests. However, I am thankful for the scholars interviewed to delve into Indian case because they provided me interesting tips to find primary sources about this country. One last caveat: since I study Political Science, this dissertation gave some priority to experts in Chemistry and Physics to refine knowledge about technical aspects.

The structure of the questionnaire is based on three blocks of questions. At first, there are more open questions about international topics. After that, the research focuses on specific topics of interest in nuclear history. These two blocks are asked of all respondents. In the third part, the questionnaire turns to more specific questions related the person interviewed is used. All the questions can be answered according to the person's willingness. For instance, people can respond to these questions in a not-recorded videoconference or hide some answers from the public. When this research refers to one of these secrecy answers, it employs a generic vocative, such as “an interviewed authority said”. Lastly, the questionnaires were available in English and Portuguese. They were delivered according to the lingua franca of the interviewed person.

On secondary sources, this study applied a technique of qualitative literature review (see Snyder 2019) to avoid a time-consuming “soaking-and-probing”⁵⁰ observation collection. These papers and books served to complement the explanatory capabilities of primary sources. For instance, these analyses are crucial to establish a theoretical debate with IR strands and inserting the Middle Power Trap into this context. Therefore, it is necessary to reduce eventual biases by focusing only on texts that went through a robust peer-review process (GRANT; BOOTH, 2009). It is also a matter of research design transparency because a study that relies exclusively on secondary sources could have been guided by a cherry-picking of evidence; that is, an intentional selection of materials that corroborates with a given theoretical explanation. Thus, I focused only on the most sophisticated and innovative research designs applied in this

⁵⁰ It is a controversial manner to collect data. It encourages scholars to accumulate as much as possible data to produce inferences. However, it can drive the research to an exhaustive and time-consuming analysis of scholarly articles.

field. This study preferred books and articles published in leading journals in the *Scimago Journal & Country* ranking on Political Science and International Relations.

2.5. Concluding Remarks: Summarizing the Methodological Design.

This chapter detailed the methodological procedures applied during this investigation. In this sense, this study undertakes a qualitative research design based on historical analysis to understand an outcome observed in a case (Brazil) This country represents a case of emerging regional power that followed the usually observed path to acquiesce to nonproliferation instruments to gain reputational assets and renounce the image of a deviant agent. Inductively, this work provides valuable insights to refine a hypothetical explanation that nonproliferation instruments are grips of a great powers-led systemic causal mechanism that attempts to make countries abide by rules. Hence, I employ process tracing to scrutinize how this causal mechanism came into being and its influence over the Brazilian S&T programs. The analyzed time span is the Cold War when international organizations established the nonproliferation regime. Finally, I contrast the Brazilian case with India (a deviant agent) who share similarities in international terms. The purpose here is not to compare the cases, but reinforce findings.

3. IR THEORIES AND THEIR UNDERSTANDINGS ABOUT INTERNATIONAL REGIMES

3.1. The IR Scholarship on International Regimes

This chapter describes the existing IR literature about international regimes – notably the nonproliferation field. It explains the theoretical underpin of the Middle Power Trap. In addition, it justifies the importance of raising this hypothesis since other IR schools of thought do not pay due attention to how subjective aspects legitimize great powers' actions to enforce globalize international regimes. In the last section, I conclude by summarizing this debate and providing compelling explanations about the choice for a given IR school of thought.

Debates about international regimes became central to IR studies during the 20th century (see Hasenclever, Mayer, and Rittberger 1997). Previously, specific sets of regulatory procedures flourished because of the advent of communication technologies and robust capital influx (CASTELLS, 2004; MCKEOWN, 1983). These cooperative arrangements counted initially more on tacit understandings and informal linkages⁵¹. In light of this, studies on international regimes became frequent when agents employed systematic efforts to set up structural regulatory mechanisms in a changing world from prior scenarios where there were only a few sovereign countries and many colonies. Largely, interests arose intertwined with the most acknowledged attempts to provide stability to international relations since the post-WWI idea of the League of Nations and the spread of regimes during the Cold War (RUGGIE, 1982).

This literature revolves around order as a necessary concept to grasp global dynamics (Kissinger 2014; Young 1980; Haggard and Simmons 1987). Order is an element valorized in the IR literature (Kissinger 2014). Similar to analyses from Political Science, this concept is also a buzzword. Different actors carry particular understandings of this term (CLARK, 1989). The lion's share of studies describes order as the maintenance of stability (Ikenberry 2020b). It is worthwhile to bear in mind that the perils of wars and economic crises triggered by disputes for power among states are an acknowledged dread addressed by experts since the beginning of this scholarship (ANGELL, 2010; KAPLOW; GARTZKE, 2021; MORGENTHAU, 2003).

⁵¹ The ancient examples of these rudimental regime-building processes hinged on reproductions of the United Kingdom's decisions. For instance, the monetary system based upon the classical gold standard that lasted until the mid-1930s (EICHENGREEN, 1984). Since London decided to adopt a gold-pound parity to solve financial issues and regulate exchange market. Other states followed the example and their central banks started internal cooperative relationships.

For example, the NPT is a well-known example of international attempts to cement a nonproliferation regime to mitigate sources of conflicts and provide stability among countries (see Annex 3). Western culture cemented a diplomatic awareness that it is possible to draw contracts and concert arrangements that prevent states from engaging in quarrels⁵² (WIGHT, 2002). Such initiative aimed to fill a post-WWII moral void and delimitate whether an action was legitimate (see Ikenberry and Nexon 2019).

In conclusion, this scholarship hinges on how agents organize the international system by establishing rules and instruments to minimize the spark of disruptive events (i.e., threats to the world order). It is a discussion about what is legitimate (ONDERCO, 2015) and who is in charge of preserving the established understandings. Great powers historically attempt to define rules and legitimize mechanisms that avoid disruptions and legitimize their prevalence (Kennedy 2010; Kissinger 2014; 1956). It is due to their material capabilities and diplomatic and economic influence (see Wohlforth 2009). In so being, "order" can be grasped according to the ambitions of great powers, regardless of the potential dissatisfaction of other agents (LARSON; PAUL; WOHLFORTH, 2014). Like in human societies, those who enjoy more assets⁵³ can promote rules according to their understanding (NEXON; NEUMANN, 2018). It is not a privilege of the United States-led order (GO, 2011; ZHAO, 2015).

History provides examples since the Roman Empire of great powers using their capabilities to draw mechanisms to preserve their leaderships (HEATHER, 2001; LINKLATER, 2004; NEXON; NEUMANN, 2018). The Victorian era (1837-1901), for instance, demonstrated how pervasive the influence of a great power is to sustain a geopolitical order (see Bell 2006). Anglo-American IR mainstream literature usually assumes that a *sine qua non* condition to the existence of an order are the great powers' actions to concert principles and manage geopolitical dynamics (CLARK, 1989). To sum up, the world order is a context where agents develop social dynamics and dominance relations become clear. The observed organizational patterns are byproducts of *habitus*⁵⁴ that shape behaviors and diplomatic decisions (see Neumann and Nexon 2018).

⁵² Scholars from the English School depicted many Western European episodes related to initiatives to orchestrate international relations (e.g., Concert of Europe).

⁵³ It is not the purpose of this study to engage in a philosophical debate about the term assets. It represents elements employed to influence decision-making procedures and other agents. A Bourdieu's approach about this topic uses the terminology "capital" to depict material and subjective attributes that societies valorized and can produce outcomes.

⁵⁴ Habitus is a core concept of Bourdieu's teachings. This is the place where social actions happen and works according to prescribed rules.

The surge of multiple agendas and global competitions, the proliferation of new countries in Africa and Asia, and the increase of interstate interdependence (NYE; KEOHANE, 1971) encourage great powers, mainly the United States, to shape and strengthen of global governance mechanisms⁵⁵ (Ikenberry 2009). It sought to organize the international relations by the use of diplomacy to solve puzzles and the draw of rules (Ikenberry 2009; Kissinger 1994; Phillips 2019). These mechanisms would cover a range of subjects from environmental protection to nuclear proliferation or human rights (Gaddis 2006; Kissinger 1994; Slaughter 1995). The Cold War demonstrated the relevance of great powers on defending and pushing for the establishment of international regimes according to their understandings (RODRIK; WALT, 2021).

These are the reasoning behind the exhaustive scholarly attention to subjects like accommodation of emerging powers⁵⁶ (Bukovansky 2016; Christensen 2015; Claar and Ripsman 2016; Ikenberry 2008; Kennedy 2010; Paul 2016; Pu 2017). Since the early beginning of studies about international politics, this context is considered a driver of global skirmishes (LEVY; THOMPSON, 2011; VAN EVERA, 1998). The concept of accommodating a country in a given order means how to make a potential challenger less dangerous to the ongoing order (see Paul 2016). It is a structural-level IR debate where many schools of thought accepted the existence of rule-makers and rule-takers. The former tries to persuade the latter to acquiesce to existing rules. Anglo-American mainstream theories sparked major discussions about this topic during the Cold War - when the legitimating of global rules and organizations gained momentum.

Traditionally, the literature on international regimes revolved around three schools of thought: realism, liberalism, and Wendtian constructivism. Since these frameworks tackled similar puzzles related to these arrangements, debates usually revolve around two ontological questions deriving from this loose assertion: “how are they established?” and “why are they established?”. Each of these queries unveils a dimension of theoretical explanations about this topic. For instance, it is possible to cluster these theories into four quadrants of a coordinate

⁵⁵ In the IR field, scientific aspects also promoted the proliferation of analyses about global governance, e.g., the “behaviorist turn”. By and large, the Anglo-American scholarship went through its “Second Great Debate” during the mid-1950s and 1960s. It cemented the influence of positivist approaches to provide *ceteris paribus* assumptions that enable the draw of general theories. For instance, scholars set databases, such as The CoW Project, to facilitate the production of generalizable propositions via quantitative methods or formal models like the rational choice analysis. This period, however, reinforced the prevalence of mainstream paradigms and their assumptions over other frameworks.

⁵⁶ The use of “emerging power” is because of the traditional terminology employed by the literature.

plane. Such a Cartesian system works because answers to these two questions can be disposed of in intersecting axes. This disposition solves some epistemological problems observed in the well-known mainstream classification of international regimes developed by Hasenclever, Mayer, and Rittberger (1997).

Despite their model represented a considerable theoretical advancement from *proto-attempts* (e.g., Haggard and Simmons 1987), it still reduced the debate about regimes to the core elements of Western IR mainstream theories. This model is ill equipped to understand properly the insights from critical and post-colonial theories. Such an initiative reinforced an “exclusive club” of theories that comprises strands hanging onto causal conditions for international regimes such as “power-based”, “interest-based”, and “knowledge-based” elements. Realists can easily be related to “power-based” conditions to draw their explanations over this phenomenon. It is possible to claim the same on constructivism and “knowledge-based” aspects or institutionalist and the “interest-based” assumptions. Yet, this initiative does not operate well for peripheral theories because they assimilate both elements from the “power-based” and “knowledge-based” thoughts⁵⁷ (see Strange 1982). Hence, this study reframes this analytical map seeking to enable an adequate inclusion of critical and post-colonial theoretical into the debate.

I proceed with this reframing exercise to organize the IR schools of thought into more accurate clusters. It facilitates the proposed analysis by systematizing the theoretical explanations that compose the Middle Power Trap’s qualitative features. As previously mentioned, I look for theories that share similar understandings that international regimes legitimize a superior social role for great powers by minimizing incentives for deviance and allowing the usage of material sanctions against outsiders. In this sense, these theories argue great powers are agents that encourage the draw of international regimes. These are instruments auguring in their favor of great powers to sustain an envisaged order and reduce contestation.

The proposed solution put the debate of international regimes’ origins on the x-axis and the mechanisms to sustain their effectiveness on y-⁵⁸. The x-axis ranges from a negotiated to an imposed regime (see Keohane 1982; Young 1986). The former refers to a perception that

⁵⁷ Largely, this is a general hurdle to IR critical approaches. Since mainstream strands hang onto Popperian scientific assumptions that theories must deliver a concise explanation, other studies face challenges due to their epistemological choices of merging intersubjective and material factors into the same framework (see Sjoberg 2014).

⁵⁸ Concurring with the model developed by Hasenclever, Mayer, and Rittberger, this framework divides IR theories into schools of thought. Hence, it is possible to have branches of realism or liberalism of in different quadrants. For instance, the structural offensive neorealism assumes certain variables and assumptions that provide a divergent idea about regimes compared to inferences from neoclassical realism studies.

international regimes derive from multilateral efforts to provide a Pareto-efficient solution for a given problem (AXELROD; KEOHANE, 2018; GOLDSMITH; POSNER, 2003; KEOHANE, 1982; MITCHELL, 1998). Independent goal-seeking agents would adhere to such a regime once they believe the negotiated rules offered an optimal result vis-à-vis their absence. The costs of adherence do not outweigh the benefits of membership. Likewise, refusing to join or leaving the arrangement would be ever-present options (KEOHANE, 1982).

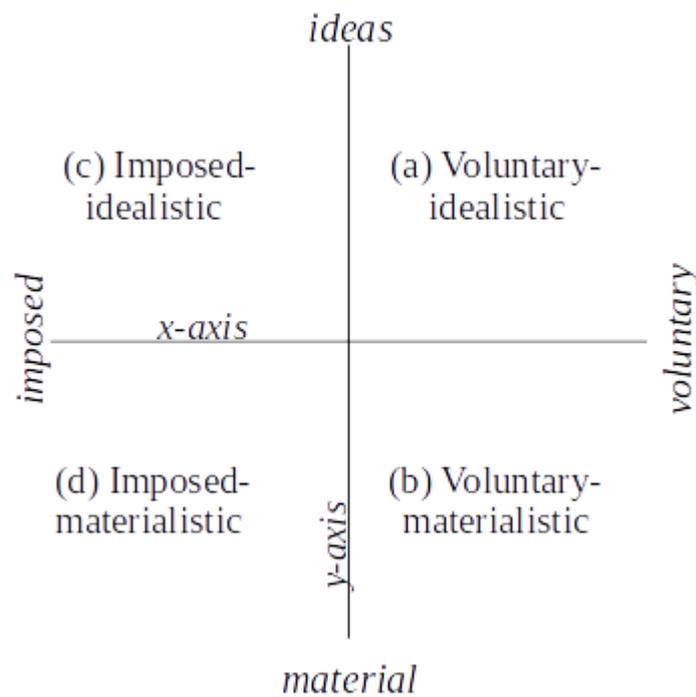
On the opposite side of axis -x, there are theories arguing international regimes are mechanisms imposed by dominant states to compel other countries to assume expected behaviors (COX, 1992; KEELEY, 1990; WARD, 2017; YOUNG, 1986). Great powers cement their interests via legal and institutional frameworks. These elements allowed them to enjoy liability for actions and increasing the costs of divergent positions (Lake 2017; Zarakol 2017). These IR branches assumed that the existence of regimes, for instance, rest on the strategy and ability of leaders to preserve the *status-quo* (Gilpin 1981; Mearsheimer 2018).

The y-axis refers to the ways employed to consolidate and sustain regimes. It ranges from cognitivist-normative to material elements. The former consists of theories that emphasize the role of ideas to preserving the social fabric of international regimes. These sociological mechanisms can be either voluntary options (Finnemore and Sikkink 1998; Ikenberry 2011; Koh 1998) or coercive dynamics and stigmatization due to unequal characteristics of an order (COX, 1981; KRISHNA, 2009; PUCHALA; HOPKINS, 1982; ZARAKOL, 2010). These authors do not necessarily reject the role of material power (JERVIS, 1982). Yet these are converted into bargaining advantage and global influence to shape norms and institutions and orient social understandings about a given issue (KARDAM, 2004; YOUNG, 1980).

The other theoretical pole assumes the primacy of material capabilities to impose a regime. These theories assume that coercion would be the only way to enforce norms and rules that unavoidably collide with national sovereignty principles. In this sense, the establishment of a regime occurs due to the great power's influence (EICHENGREEN, 1987; GOWA, 1989; KINDLEBERGER, 1981). Cognitive elements are reduced to fearsome aspects due to the repressive mechanisms applied against rebel countries (e.g., economic sanctions and military forces) (Gilpin 1981; Mearsheimer 2018). Ideas are secondary aspects because these authors assumed that great powers constantly employ direct efforts to preserve regimes.

The Image 2 illustrates how this Cartesian system is divided into four categories of international regimes theoretical schools: (a) voluntary-idealistic; (b) voluntary-materialistic; (c) imposed-idealistic; and (d) imposed-materialistic.

Image 2– The Classification of Scholarly Understandings about International Regime



Source: own elaboration

In the quadrant (a) voluntary-idealistic, theories claim regimes would exist because of natural pledge of states for order and peaceful relations (BOLI; THOMAS, 1997). These mechanisms could establish long-term cooperation in issue areas (FINNEMORE; BARNETT, 2004; FRIEDMAN, 2005). This context would gravitate over the globalization process that arguably merged national ambitions into similar interests on international relations (MEYER et al., 1997). These frameworks believe countries are keen on adhering to a set of regulatory arrangements since it provides a firm underpinning for fulfilling the expectations of international stability. According to these strands, subjective variables play a relevant role in this field. Alas, cultural principles, normative incentives, and idealistic values can motivate these decisions. This set consists on theoretical cannons such as World Polity (Meyer *et al.* 1997), Neofunctionalism (HAAS, 1983; MATTLI; SLAUGHTER, 1995), Hayekian

Liberalism⁵⁹ (HAYEK, 2017), Constructivisms⁶⁰ (FINNEMORE; BARNETT, 2004; WENDT, 1994), and the International Law scholarship on compliance (HENKIN, 1979; KOH, 1998; RAUSTIALA, 2002).

These strands, therefore, valorize the causal force of “belief systems”. Yet these authors do not claim states do not rely on material power. They argue social factors currently encourage multilateral solutions because of the spread of knowledge (TANNENWALD, 2005; WENDT; FRIEDHEIM, 1995). For example, a revulsion associated with the potential to use nuclear technologies to build weapons or the risks of accidents would motivate regulatory agreements (GADDIS, 1987; TANNENWALD, 2005). Social movements (GABRIEL; MOTTA, 2021; KRAFT; NEHRING; SACHSE, 2018; WITTNER; BOTHWELL, 1998), the scientific community (ADLER, 1992), non-governmental organizations, and international institutions (Ikenberry 2011) could constrain states’ decisions to develop overt nuclear policies by creating a “world public opinion” (ADLER, 1992; REISS, 1988). An example of advocates of the quadrant (a) was the nourished idea by scientists (e.g., Albert Einstein, Enrico Fermi, Niels Bohr, Robert Oppenheimer, and Leo Szilard) to set an international authority endowed with a nuclear monopoly that would drive international relations according to the people’s will of reducing tensions among nations and enabling cooperative ties (CAMARGO, 2006).

The cluster (b) voluntary-materialistic claims unequal global distribution of material power is a crucial factor for explaining regimes’ origins. However, it does not imply unenthusiastic consequences for international relations. Great powers were endowed with diplomatic, economic, and military assets. They can provide public goods and stability to other countries (Bull 2012; Ikenberry 2011). Assimilating to the quadrant (a), these authors assume that states rationally head towards a more stable system via cooperative ties under an asymmetrical disposition of the balance of power (AXELROD; KEOHANE, 2018; MILNER, 1992).

For instance, there are scholars in this group that believe in the capacities of the liberal world order to handle thorny issues, such as nuclear proliferation, since great powers can employ robust efforts to convince others (WALKER, 1998, 2000, 2007). These negotiations

⁵⁹ It is a controversial topic in the book *Road to Serfdom*. Hayek said institutions have to emerge spontaneously due to natural dynamics developed by agents. Likewise, his theory employs an individual level of analysis to contest arguable side-effects of public policy on the well-being of citizens. But, this scholar claimed that the necessity of specific structural mechanisms to regulate international relations and avoid expansionist ambitions of sovereign states.

⁶⁰ It also considers Wendtian constructivism a member because this theoretical framework assumes that cooperative ties between countries can flourish via common normative understandings, such as the Kantian anarchic structure where agents peacefully strengthen their ties due to ideational elements (see Wendt 1992).

produce a Pareto optimal situation where less powerful states would enjoy benefits provided by great powers⁶¹ (BUTT, 2013; LAKE, 2011) that would also fulfill their interest to cement their influence throughout the world. The rest of the countries could join these mechanisms by either demonstrating their loyalty to great powers (SCHWELLER, 1994), believing in their promised benefits (AXELROD; KEOHANE, 2018; GRIECO, 1988), or employing free ride thinking of accepting these rules opportunistically – once they are not requested to give considerable contributions. This group of theories is composed of English School⁶² (BULL, 2012; WATSON, 1987), Wilsonian liberalism⁶³ (Ikenberry 2011; Kupchan 2014), Liberal Neoinstitutionalism (KEOHANE, 1982), and Rational choice realism (Grieco 1988; Grieco, Powell, and Snidal 1993; Snidal 2002).

International regimes could be efficient mechanisms to reduce incentives for nuclear proliferation and regulate the trade of raw materials and the production of electric power (GUZMAN, 2008; SMITH, 1987)]. This arrangement would affect dialogues and political bargaining between states (see Nye and Keohane 1971). Although some rules could be considered unfair (see Hoffman 1986), states would accept them because either all countries would commit to the same end or due to the great powers' role of enforcement agents (NYE, 1985). Authors from the English School even criticized Global South countries for avoiding adherence to the nonproliferation regime since it was an effort to manage international crises (see Bailey 1987).

Treaties and agencies make deviant behavior more costly and stigmatize some strategies as illegal acts and, thereby, they provide bases for sanctions. Nonetheless, some studies claimed

⁶¹ Cooperation among states was a discussed topic during the so-called “Neo-Neo debate” between Anglo-American IR mainstream branches (e.g., neoinstitutionalism and neorealists). Since this subject revolved the formal modelling of rational choice (e.g., prisoner dilemma and absolute/relative gains), many works developed mathematical explanations to measure the required values of variables to states set cooperative ties. On this topic, see: Grieco (1988); Keohane and Martin (2014).

⁶² It is a controversial topic. Some readers would suggest that this analytical exercise misplaced the English School. Although scholars claimed the relevance of ideational elements to sustain international order, this concept gravitates over the legitimation of great powers as responsible agents to preserve peace in the world society. In this sense, it is not an organic process whereby countries agree to follow a given way. The English School believes that great powers enforce their prevalence among other states and expand their influence. Hence, other states assume this context can be more desirable than a scenario with conflictive disputes. In this sense, the legitimacy of great powers depends on their capabilities to enforce their position over other countries. Such an assumption hinges on the relevance of material assets (CLARK, 2009, 2011; LINKLATER; SUGANAMI, 2006; MENDELSON, 2009). However, some English School's discussions over subjective elements that reinforce this global hierarchy can provide valuable insights to theories in the quadrant (c). It is placed in the edge of these two sets. That is the reason for assuming some elements from this theory to build the Middle Power Trap.

⁶³ Wilsonian liberalism incorporates similar approaches to the perspectives observed in quadrant (a). However, the surge of regimes and provision of order is not a spontaneous phenomenon. It hinges on the efforts employed by great powers to provide stability by establishing liberal-led institutions and arrangements. Despite the voluntary adherence to these frameworks, states rely on the strength of (democratic) great powers to spread a system of values.

the establishment of international organizations encourages states to share information and facilitate compliance with norms (see Carnegie and Carson 2019). Although some states can use nuclear energy to reduce their vulnerability to a global crisis, these rules remind countries that the self-defense production of weapons could trigger considerable side effects (RAJAGOPALAN, 1999; SOLINGEN, 2009, 2012). Therefore, when states decided to assume deviant behavior, these regimes could outweigh the benefits of these attempts (Faillo, Grieco, and Zarri 2013; Grieco 1988; Grieco, Powell, and Snidal 1993; Keohane 1998).

Inside the quadrant (c)⁶⁴ imposed-idealistic there are post-structuralist (KEELEY, 1990; ONUF, 2012), critical (CHANG, 2002; COX, 1989), the “Eclectic Kautilyan thinking about IR⁶⁵” (MODELSKI, 1964; SHAHI; SHAHI; ROUGHLEY, 2019), Social Identity (LARSON; PAUL; WOHLFORTH, 2014; LARSON; SHEVCHENKO, 2010; RUBLEE, 2008), Queer theory (RICHTER-MONTPETIT, 2018), critical feminism (SJOBORG, 2012), and post-colonial scholarships (KAPUR, 1980; MAZRUI, 1989; POULOSE, 1979). They consider international regimes an imposition of the strongest countries. It also includes the Latin American theory of autonomy (JAGUARIBE, 2008; PUIG, 1986) which could be classed in the quadrant (d) due to the emphasis on material capabilities. Nevertheless, the presence of subjective factors in its analytical model led this IR strand to this cluster. For example, these scholars claimed social and cultural elements are also relevant to understand the hierarchy among states and how great powers hamper the consolidation of autonomy policies in other countries (JAGUARIBE, 1979). That is the same reasoning behind the allocation of Neoclassical realism⁶⁶ into this set (FIAMMENGHI et al., 2018; FOULON, 2015; LOBELL et

⁶⁴ The lion’s share of theory from the quadrant (c) surged after the Anglo-American “Third Great Debate” during mid-1980s and 1990s. It was a period of internal epistemological contestation in the IR field. Reflexivist approaches gained momentum (George 1989; Kristensen 2016; Lapid 2003). In this sense, a relevant scholarly group, the so-called “Perestroika Movement”, lamented the all-pervasive thinking that rigorous methodological modeling trumped substantive theoretical development (Mearsheimer and Walt 2013). Post-positivist and interpretivist methods became more frequently employed, such as discourse analysis and ethnography. This scenario triggered different perspectives about international regimes and provided bases for grievances against world order mechanisms.

⁶⁵ Many Indian thinkers delved into Kautilya’s ancient studies about international relations. It is a field under construction, but it has already unpacked many relevant understandings about the power struggle among global agents and their social interaction. Although some scholars considered this Indian thinking similar to the epistemological roots of Anglo-American realism (related to some parts of the book *Arthaśāstra*) (BOESCHE, 2002), there is an indigenous theoretical eclecticism that merged subjective and material elements into the explanatory design. There are many comparisons with Wendtian constructivism and other Non-Western approaches. In this sense, studies about international regime and global ordering gain considerable insights from these analyses.

⁶⁶ It is a controversial topic because neoclassical realism’s causal chain hinges on material disputes. However, the epistemological idea of assuming some subjective aspects from classical realism, e.g., dispute for prestige and the inclusion of domestic causal factors to explain power struggle, reduced the analytical level of abstraction. Such subjective forces are grasped as intervening variables. It provided bases for many neoclassical studies that elect

al., 2009; PU; SCHWELLER, 2014; ROSE, 1998; WOHLFORTH, 2009; WOHLFORTH et al., 2018).

These studies advocate regimes are mechanisms derived from great powers' ambitions. Unlike cluster (b), these scholars usually emphasize the side effects of great powers' interests. Regimes consolidate the prevalence of given standpoints and thereby normalize discriminatory instances. In this sense, these countries are norm entrepreneurs who interpret existing standards and promote their ideas. Their ideals, for example, became assimilated as modernizing, peaceful and progressive bulwarks (Zarakol 2017). Other perspectives and understandings are stigmatized. Other countries acquiesce to such socialized elements and strive to follow those (LOPES; CASARÕES; GAMA, 2020).

Hence, international regimes perpetuate domination and inequalities among states (see Zarakol 2010). In light of this, the widespread awareness that given mechanisms (e.g., international regimes) may provide stability to the system derives from a social scenario where actors acquiesced to the arguable great powers' attempt to reduce global uncertainty due to fears of invasion or disruptive behaviors (see Adler-Nissen 2014). Unlike quadrant (a), these theories do not believe common values arise naturally. Countries are lured into great powers' narrative that they work to restrain deviant agents.

In the last cluster (d) imposed-materialistic, theories championed great power impose regimes by force or coercion. Unlike quadrant (b), these authors usually do not consider the other reasoning behind small countries' adherence to these mechanisms, but the fear of upsetting mighty countries. Thus, a great power stabilizes a given area, but they employ material resources to sustain these regimes. This actor foments mechanisms and enforces other members' compliance with the regime. Subjective variables are not included in the model. This set consists of both offensive and defensive neorealism (Mearsheimer 2001; Waltz 2010), Materialistic World System scholarship (ARRIGHI, 2005; WALLERSTEIN, 1984), Structural Marxism (DEUDNEY, 2000; GILLS, 1987; HALLIDAY, 1994), peripheral realism (ESCODÉ, 2014, 2015; SCHENONI; ESCUDÉ, 2016), and the Economic school of Hegemonic Stability (EICHENGREEN, 1987; KINDLEBERGER, 1981; TAVARES; METRI, 2020).

subjective aspects crucial to their theoretical research designs. In this sense, this strand is considered a member of the quadrant (c).

Material capabilities and disputes for power, in this sense, are considered the most relevant aspects of nuclear ambitions. Hence, these initiatives would be assessed as if their real motivation were military-led causes (FUHRMANN; LUPU, 2016; SAUNDERS, 2019; WALTZ, 1981). Thus, many strands in quadrant (d) share a pessimist perspective about the maintenance of regimes, especially on security-related topics. Largely, rules to preserve global order would fail to achieve this goal because states usually do not forego defensive assets (Jervis 1982). Regimes could work only if great powers employed efforts to sustain their interests (Mearsheimer 2018) via direct mechanisms like sanctions or military incursions (e.g., preemptive strikes⁶⁷ like the United States war against Iraq in 2003). Unlike the set (c), these theories do not consider the influence of social restraints such as the stigmatization of behaviors.

Therefore, the Middle Power Trap evokes the literature that composed the bloc (c) imposed-idealistic because it exposes the mechanism that produces social boundaries to define appropriate behaviors and roles. Such a phenomenon demonstrates how pervasive discourses legitimize inequalities and reduce available alternatives of the lion's share of states (LOPES; CASARÕES; GAMA, 2020). These ideational aspects reproduce power relations between great powers and the rest of the world – including the emerging powers. To leap forward this discussion, it is relevant to systematize this thinking and unveil its contribution to the field. There is still a lack of formalized hypotheses about the non-proliferation regime and the North-South cleavages. The following chapter elaborates on a theoretical framework that can be employed during this research.

3.2. Concluding remarks.

International regimes are a traditional topic for IR studies. Since a mainstream puzzle for these works is how to provide stability for international relations, the existing organizational instruments have received considerable attention from analysts. In this sense, debates about world order are vital to address the meaning of international regimes since the latter exists to preserve the former. As demonstrated during this chapter, the order is not a neutral concept. Order means what whoever proposes it understands as an organized system. Hence, it hinges on a context where some actors hold sway over the features of existing social dynamics by prescribing norms and drawing instruments to minimize contestations to the status quo. These influent agents are the great powers - countries that compose the higher social stratum.

⁶⁷ On preemptive strikes, see Bas and Coe (2012); Debs and Monteiro (2014); Van Evera (1984).

Different IR theoretical strands disagree with this epistemological understanding. However, other approaches share similar thinking. These theories argue that the world order and regulating instruments are not simply imposed by force. There is a social context legitimizing these elements and pressuring other agents to acquiesce to these instruments as they become globally accepted as efforts to preserve peace. This IR literature aims to expose social elements in international regimes, such as the legitimation of great powers' interests and the stigmatization of similar ambitions from developing powers. Mainstream scholars could consider this argument outdated because many countries adhered to regimes, and these mechanisms proved efficient in promoting peaceful interactions. However, these strands do not take into account how this process of adherence happens, the possible negative consequences of international pressure, and the legitimation of rules dictated by great powers for the full development of some countries.

This chapter reframed the classical conceptualization exercise developed by Hasenclever, Mayer, and Rittberger (1997) to systematize these strands into a single "school of thoughts". I decided to divide IR theories according to their epistemological understandings about the origins and aims of international regimes. I came up with four different clusters: (a) voluntary-idealistic; (b) voluntary-materialistic; (c) imposed-idealistic; and (d) imposed-materialistic. The Middle Power Trap hinges on the (c) imposed-idealistic school. Each group refers to different lenses for assessing the significance of international regimes for global dynamics. The best option for the Middle Power Trap hinges on the (c) imposed-idealistic group – which is marginally represented in mainstream debates about the topic.

The school of thought (c) could explain that the existence of this causal mechanism in international relations comes from the critical understanding that cultural aspects underpin social hierarchical structures. Since collective beliefs incorporate a given set of values and paradigms, the costs of going against these understandings increase due to possible social reactions - e.g., stigmatization (subject addressed in chapter 4). That is, defectors are considered dangerous revisionist players even if they claim existing rules hinge on unfair bases. States are usually afraid of assuming dissident roles due to social exclusion and diplomatic and economic pressures. Some countries can try to manage this stigma or face it with a proud attitude, but the labels used to legitimize repressive actions can spread some sort of social awareness that goes against their interests, so other nations might even avoid deepening diplomatic ties due to the fear of approaching deviant agents.

In light of this, an unequal distributional system of material capabilities ends up providing incentives for the consolidation of status-quo settings through subjective means. Material

capabilities alone are not sufficient to make a country enjoy tangible benefits in the global order, though; international relations also have a Durkheimian sociological dimension of “moral ordering”. Not fortuitously, the usage of material enforcement mechanisms became restricted to a superior stratum whose abundance of means prevents short-term defection. Or, employing a critical lexicon, hegemony among nations rests upon a superstructure whereby great powers legitimize their interests.

Unlike quadrants (b) and (d), which pay closer attention to material factors, the idea behind the Middle Power Trap lies in a critical understanding that explanatory leverage of historical materialism increases when subjective causes are considered (COX, 1981). This proposition assumes that the normative system plays a relevant role in international relations. Therefore, the ontological argument for the existence of the Middle Power Trap comes from Gramscian understanding that cultural aspects underpin social hierarchical structures (see Cox 1981). The costs of going against these understandings increase due to possible social stigmatization (Zarakol 2010). That is, defectors are considered dangerous revisionist players even if they claim existing rules hinge on unfair bases. They can receive derogatory labels such as “rogue” states (GEIS; WUNDERLICH, 2014) and carry negative stereotypes against their international behavior (SMETANA, 2020). Finally, it differs from the quadrant (a) because states do not adhere voluntarily to international regimes. They could be persuaded to do so – notably the emerging regional powers.

I will address this topic more in-depth in the following pages. This chapter concludes that the Middle Power Trap consists of a sociological-led explanation of how great powers (agents) encourage the establishment of international regimes (instruments) to exert legal pressure against actors who challenge the status quo. By claiming so, this causal mechanism is better assessed via theoretical strands that grasp international socialization as an unequal phenomenon where the higher stratum persuades others and spreads a sense of what is “normal”. Deviant agents, in this sense, are stigmatized like Goffman (2018) described in human society since this social process occurs because of a consolidation of values and normative aspects that constitute a reality (Zarakol 2010). Since the stigmatization fulfills its objective to shun a member from the society, it enables the protectors from the order to punish it.

4. THE MIDDLE POWER TRAP

I describe the main hypothesis of this dissertation in this chapter. The Middle Power Trap is a causal mechanism that hinges on the theoretical understandings from quadrant (c). The purpose of this chapter is to draw the qualitative features of the Middle Power Trap and elaborate on the hypothesis. This exercise tentatively proposes the elements that findings from Chapters 5 and 6 refine. Thus, I divide this chapter in three parts: (a) a description of this hypothesis; (b) the theoretical bases of this causal mechanism; and (c) the concluding remarks to summarize this section.

4.1. The Description of the Hypothesis

In a few words, the Middle Power Trap consists of legitimized instruments that great powers can employ to preserve the existing order and, thereby, hamper emerging powers from attaining the capacity to master cutting-edge nuclear technologies (in the analyzed case). This is the main hypothesis: international regimes can hamper the development of emerging regional powers because they attempt to preserve an unequal status quo (SMETANA, 2020) by regulating policies while legitimizing great powers as promoters and protectors of these systemic-level instruments (ONDERCO, 2015). For example, the nonproliferation regime provided important examples of instruments to induce behavior and reduce international contestations (RUZICKA, 2019). By assuming this status-seeking dimension, I claim NWSs actions to preserve and spread the nonproliferation regime affect negatively emerging powers' scientific developments. Since S&T programs from emerging regional powers have to abide by regulating rules, it creates hurdles to attaining the same level of development observed in NWSs. It is worthwhile to remember that great powers achieved the mastering of S&T procedures (e.g., nuclear technologies) without these restrictions (DE ARAUJO CASTRO, 1972). If an emerging regional power decided not to adhere to the international regime, it triggers legitimized instruments, mainly operated by NWSs, that attempt to make the country change this decision (SMETANA, 2020).

The existence of institutional (e.g., NSG) and diplomatic efforts (e.g., sanctions) to make countries comply with rules and regulate dual-use items exports is well acknowledged in the nonproliferation history. There is a consolidated literature about how export controls arrangements worked to harmonize atomic-related market rules according to the interests of Western industrialized nations and the Soviet Union, since the 1960s with the initiatives that

preceded the NSG like the Western Supplier Group and the Zangger committee⁶⁸ (ANSTEY, 2018). For instance, an emerging powers' well-known complain is the NPT froze global distribution of power by legitimizing an unfair system (see Singh 1998) where NWSs could exert pressure against NNWSs' scientific programs via diplomatic, economic, and military means (POULOSE, 1979). However, a historical process sets up this context. This is the first part of the investigation about this hypothesis (chapter 5). The context that permits international regimes to augur in favor of great powers hangs onto the historical development of such international dynamics (ZARAKOL 2010).

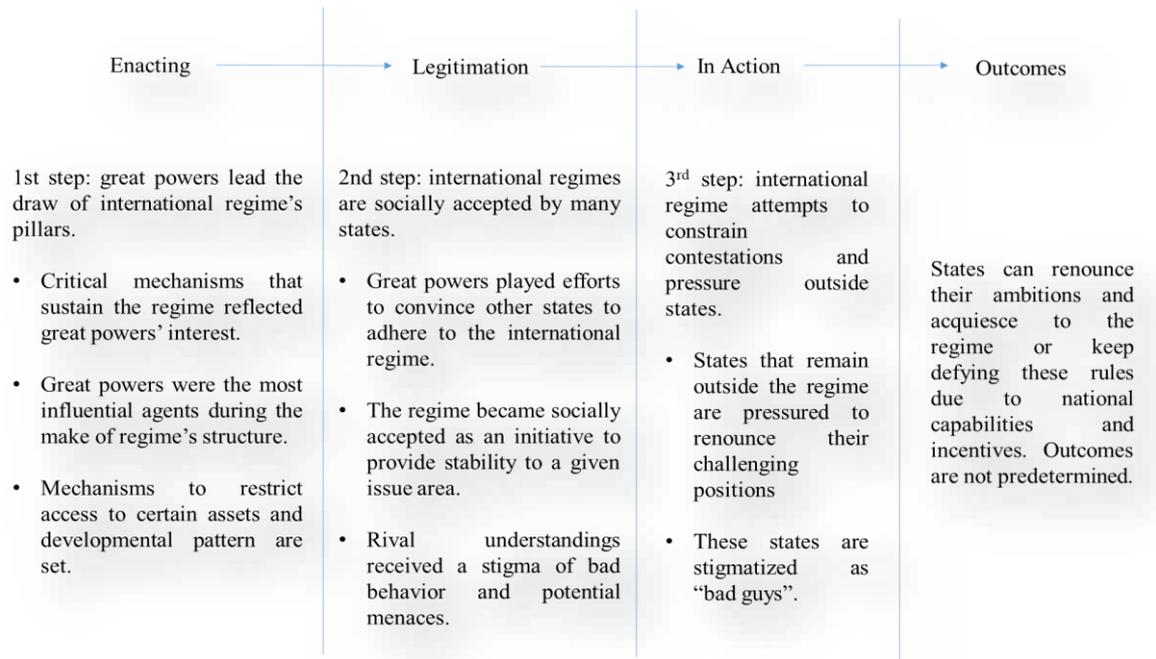
As Image 3 illustrates, I propose the “life cycle” of this process. Indeed, I include theoretical refinements that avoid deterministic results since targeted countries can employ domestic assets to face external causal forces (chapter 6 and 7)⁶⁹. This chain of events is divided into four key moments (i.e., 1. *enacting*, 2. *legitimation*, 3. *in action*, 4. *outcomes*) and permits a better understanding of how international regimes set the Middle Power Trap – and how it works.

1. (Enacting) Great powers influence global decisions to regulate a given issue area. These countries use both their normative and material assets to sustain their social role of supposed natural leaders in a *de jure* anarchical structure. They conduct negotiations to draw the core pillars of the regime.
2. (Legitimation) During this moment, great powers attempt to universalize the regime based mainly upon their understandings. This social context became pervasive when the majority of states accepts possible existing inequalities reinforced by international regimes are acceptable. It legitimizes their efforts and the establishment of mechanisms to punish challenging understands – named as Middle Power Trap.
3. (In action) The regime employs mechanisms to exert causal force when it founds a deviant case. It is the period where I can identify the establishment of the Middle Power Trap.
4. (Outcomes) Yet countries have their own skills and face idiosyncratic contexts. They can perfectly use national capabilities to overcome stigmas, sanctions or military-related threats and discredit regimes.

⁶⁸ The Zangger committee was a scientific-led project in 1970, chaired by the Swiss professor Claude Zangger, which debated the establishment of some controls on a list of sensitive products involving nuclear-related technologies, according to the NPT.

⁶⁹ Our research design hinges on a deterministic logic only to affirm great powers use regimes to enact causal mechanisms that constrain the aspirations of a deviant state.

Image 3 – The Middle Power Trap’s life cycle.



Source: own elaboration.

As long as I am dealing with a historical-led hypothesis, the first part is finding evidence that attests to the existence of this causal mechanism as a legitimated set of instruments led by great power. Hence, chapter 5 is an investigation of the two first steps of this causal chain – i.e., enacting and legitimation. In conclusion, I look for elements attesting to (a) great powers influenced the establishment of the nonproliferation regime while NNWSs enjoyed limited space to raise their opinions. (b) NWSs attempted to globalize the main nonproliferation instruments and convince NNWSs that they were efforts to preserve global peace and foster cooperative ties that could enhance S&T development worldwide.

This investigation’s second part addresses the Middle Power Trap in action and the possible outcomes – in the Brazilian case, the adherence to nonproliferation instruments causing the abdication of indigenous-led nuclear ambitions. Hence, I delve into Brazilian nuclear history to find elements attesting to a stigmatizing process against this country, which consequently legitimized actions from NWSs - and partners - to pressure Brazil to abide by rules. Likewise,

this investigation seeks to unveil how Brazilian⁷⁰ policymakers tried to handle these pressures. Thus, I need to find the following aspects to validate my hypothesis⁷¹:

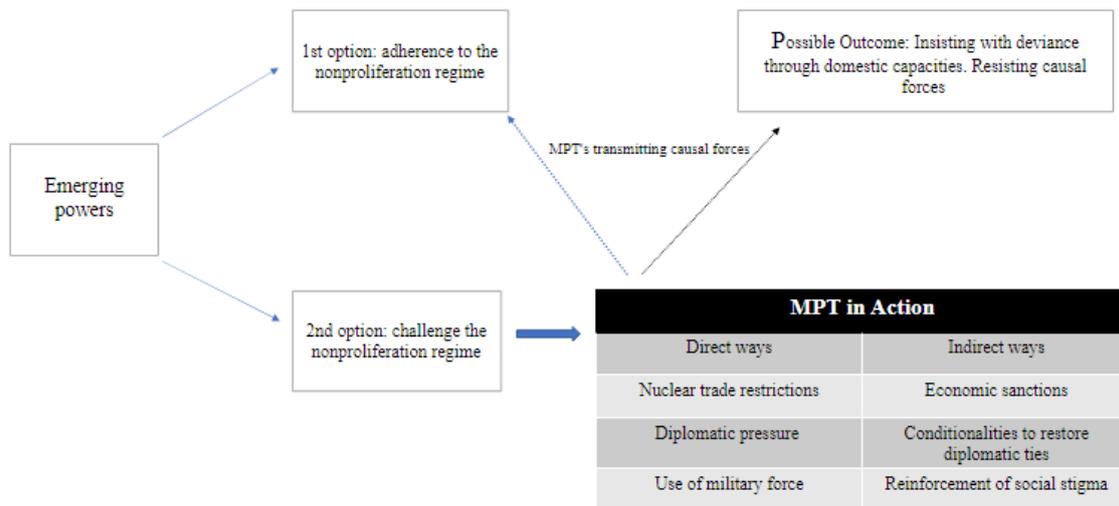
- Brazil was stigmatized as a potential source of threat. Examples of evidence are: (a) countries avoided negotiating nuclear-related equipment and technologies because of Brazilian decisions; (b) diplomatic speeches and documents complaining against Brazilian nuclear policy; (c) the social legitimacy granted to against Brazilian S&T program and economy (e.g., sanctions).
- NWSs attempted to make Brazil renounce to the nuclear ambitions via different two sources of pressure:
 - (a) "Direct ways" targeting specifically a deviant case's nuclear program. They are composed of specific nuclear trade and economic restrictions, diplomatic pressure exclusively over the nuclear program (e.g., bilateral meetings), and the use of force (as *an ultimo ratio*).
 - (b) "Indirect ways" in which great powers conditioned broad issues (e.g., diplomatic negotiations, foreign assistance, and economic sanctions) to other countries adherence to nonproliferation mechanisms. For example, the use of foreign assistance to make a country dependent in imports and less interested in developing indigenous S&T projects is an interesting tool analyzed during this study (Chapter 6.2.2). Likewise, it can hinge on stigmatization campaigns against the state to reinforce the legitimacy of their actions.
- Brazilian policymakers demonstrated concerns about proceeding with actions that could trigger diplomatic skirmishes. It reduced interest in S&T autonomous-led policies.

Image 4 illustrates this context related to the Middle Power Trap in action within the causal chain.

Image 4 – The Middle Power Trap in Action.

⁷⁰ I am referring namely to Brazil because this is the addressed country.

⁷¹ Since this study hinges on an inductive investigation logic, these topics can add new examples according to the observed findings. I describe only some examples to illustrate the characteristics.



Source: own elaboration

It is necessary to explain the qualitative features of this causal mechanism. Hitherto, I explained it comprises existing regulating instruments to reduce incentives for deviance and preserve the status quo. This mechanism gains legitimacy via social recognition, although it hinges on understandings elaborated mainly by the most influential actors in the international system – e.g., the great powers. Likewise, the hypothesis is that this causal mechanism exists, but results are uncertain because it depends on how emerging regional powers managed the situation. In the following pages, I will provide more in-depth explanations about how this hypothesis derives from the theories composing the school of thought (c): imposed-idealistic. This section conceptualizes the crucial characteristics of this mechanism by responding to fundamental questions related to theory-led issues.

4.2. The Theoretical Bases of the Middle Power Trap.

As described in the last section, this discussion is divided into main questions about the theoretical bases of the Middle Power Trap. I aim to explain how the Middle Power Trap is a hypothesis that enjoys external validity. I shed light on the elements that underpin my suggestions that material power is not the only factor that sustains hierarchies among nations. Stigmatization is a phenomenon that plays a relevant role in this context (see Wagner, Werner, and Onderco 2014; Smetana 2020; Onderco 2015). While states are required to follow some consensual standards (CASARÕES, 2020), they also have to sustain social positions (SAHA, 2022). When a given country is grasped as a dangerous actor attempting to jeopardize global efforts to achieve world peace (ADLER-NISSEN, 2014), it can suffer severe consequences from other peers – mainly great powers (NWSs, in this case) (SMETANA, 2020). In this sense,

this context can hamper the development of emerging regional powers by creating hurdles to their S&T policies – in the nonproliferation case.

Thus, the first action is to describe *the reasoning of the Middle Power Trap's existence*. This proposition hangs onto the idea that international relations happen in a socially stratified system sustained by a phenomenon called hegemony. Firstly, the Middle Power Trap is a mechanism that became evident during modern eras when states became *de jure* equally sovereign entities⁷². However, social dynamics organize states according their capabilities and influence – establishing a hegemony. From a Gramscian perspective, it is the coordinated systemic-level set of rules and values that sustain the prevalence of great powers (COX, 1983). It preserves the status-quo via normative mechanisms incorporated by organizations and diplomatic arrangements and legitimates the use of force to enforce stability (RAMOS, 2021). It implies a Machiavellian political logic where leaders elaborate mechanisms accepted by their vassals, but it can employ material capabilities to punish a rebel agent (COX, 1992). Such convincement option became more feasible than wagging many wars.

Hegemony operates in subjective arenas where stronger agents exercise the necessary influence to constrain undesirable issues without undermining their privileged positions (Nexon and Neumann 2018). Therefore, the international field is a social arena where not only material factors transmit causal forces but also interactionist elements produce also political outcomes via normalizing behaviors and shaming deviant agents (Adler-Nissen 2014; Smetana 2020; Zarakol 2014).

The highest stratum (i.e., great powers) comprises a privileged club that convey their values and civilization standards throughout the system (COX, 1983, 1992; GERMAIN; KENNY, 1998; LARSON; PAUL; WOHLFORTH, 2014). Since these ideational aspects underpin international arrangements, these states legitimize their ambitions and policies to foster these rules to other countries (Zarakol 2010). The existing mainstream literature over this process usually address the outcomes for great powers and calls it as the establishment of a world order (Ferguson 2008; Gilpin 1981; Ikenberry 2011; Slaughter 1997). Countries, therefore, are agents that produce the features of their social dynamics according to existing the distribution of power and influence. Names like *Pax Americana*, *Pax Romana*, or *Pax Britannica* illustrated this affirmative. These were periods when global dynamics emulated the ways of life of great

⁷² Previously, historical analyses demonstrated great powers could resort to expensive strategies of conquering wars and military-related decisions due to the lack of robust incentives for the establishment of global juridical and diplomatic understandings (see Bull 2012; Kang 2010; Osiander 2001).

powers such as the United States, Roman Empire and the United Kingdom (KUPCHAN, 2000, 2014; MORRIS, 2010; PARCHAMI, 2009). International relations assimilate the values of leaderships and, thereby, normative aspects influence structural disputes for status and power. Systemic-level mechanisms surge and operate according to hegemonic elements that sustain global order.

Such discussion about hegemony is relevant to the Middle Power Trap because, from a sociological perspective, the dynamics between countries produce a global awareness about who are the legitimate actors to perform specific activities (ONUF, 2012). The socialization process, occurring in international relations (THIES, 2001), unpacks the attempts of great powers to preserve the status-quo via diplomatic and institutional arrangements (Walker 2002). The constraints of the possibilities of other states to attain the level of great power became naturalized as efforts to sustain global peace and avoid disruptive behaviors (Zarakol 2010). It is like an “infantilization” of other states because great powers make others believe they need to follow exogenous rules prescribed by responsible and legitimate leaders (Smetana 2020).

Great powers work to build a hegemonic structure that ensures the global conformity to the expected behavior and makes force just the last resource (Cox 1983; Onuf 2012). These countries employ strategies to spread their interests and values to socialize them (Ikenberry and Kupchan 1990) as civilization standards and moral conduct guidelines (HOM, 2010; MACKAY, 2019; ZARAKOL, 2010). As Clark (1989) argued, some decisions are resolved via the use of force. Nevertheless, in many cases, decisions favor great powers without any effort. In other words, the role of great powers in the international relations emulate a Nozickian “hidden-hand”. An elite leads a process to an expected result without undertaking explicit action (NOZICK, 1994), giving the impression that it arose spontaneously.

It is crucial to the qualitative features of the Middle Power Trap. Great powers could consolidate this social awareness via normative assets, but socialization can occur by stigmatizing who goes against the prescribed rules. Spreading norms and making the majority of countries stigmatize peers considered abnormal legitimizes, in the last instance, punctual use of force and encourages deviant agents to rethink their initiatives and acquiesced to “normalness” behaviors⁷³ (Smetana 2020).

⁷³ Some authors consider this aspect as “normalization”. It presupposes that an agent wants to follow rules considered normal because of social pressures (see Smetana 2020).

International socialization of normative beliefs is not necessarily a peaceful process in which countries assimilate exogenous interests by considering positive influence. The hierarchical stratification establishes a power relationship of dominance. Great powers promoted an international campaign against deviant agents by labeling countries as a threat and inducing them to assume divergent behaviors from their original interests. As Goffman (2018) stated, this phenomenon of labeling agents is an interactional dynamic and reproduces cleavages existing in society. According to the employed school of thoughts, international norms would be spread because of the influence of some agents who also stigmatize and socially exclude transgressors (see Werner 2014).

Hegemony encourages states to emulate great powers' values. The world order persuades countries to emulate great powers' values, they renounce indigenous understandings to catch up with external modernizing and societal patterns (see Hatuel-Radoshitzky and Jamal 2021). It serves to stigmatize rebel behaviors on foreign policy⁷⁴. Other countries, for example, would assume that an international member that acts against global norms represent a menace (Zarakol 2010). Other states have incentives follow the rules once a promoted social awareness prevails. History provides many examples of this dynamic. Tzarist Russian nobility, Meiji's dynasty, Kemalist regime, and many Brazilian administrations adapted their national cultural, economic, and educational systems to meet Western modernizing patterns (Lopes 2020; Zarakol 2010).

Likewise, the long history of colonialism that enforced non-Western states to follow exogenous rules and understanding is also an example of this context (Acharya and Buzan 2019; Bajpai and Parashar 2020; Ikenberry and Kupchan 1990; Krishna 2009). For instance, Japanese diplomats adopted Western vestures and diplomatic techniques, during the 19th century, to increase their prestige in negotiations with counterparts of the United States (see Nexon and Neumann 2018). To sum up, great powers define normative elements and organize social dynamics during an era – consolidating a world order. It legitimizes great powers as protectors of norms to reduce challenging interests that could disturb international dynamics (see MacKay 2019). Thus, other agents stigmatize deviant countries (Zarakol 2014) – that is, who do not agree with existing rules defined by great powers. In this sense, there are social differences even in a world where countries are equal according to juridical understandings. A typical period to observe this phenomenon is the post-WWII world order (see Bieler and Morton 2001).

⁷⁴ Other literatures demonstrate that the draw of a world order also stigmatize racial and gender aspects, see: (CHOWDHRY; NAIR, 2003; VITALIS, 2016).

Despite valorizing the sovereignty as a universal feature⁷⁵, such a post-Westphalian order propelled unequal relationship between “colonized” and “colonizers” due to the long-lasting centuries of colonialism (DE CARVALHO; LEIRA; HOBSON, 2011). Hence, the post-WWII order was a period built upon the understanding of the great powers’ condominium. Jaguaribe (1979) demonstrated, according to a Latin American standpoint, that this era was a negotiated “*imperial*”⁷⁶ system”. Although studies demonstrated that liberal ideas prevailed in the UN (Ikenberry 2011), the Soviet Union was, therefore, a crucial country to draw these arrangements⁷⁷ (BAILEY, 1987; GAREAU, 1972; HAZARD, 1945).

This historical background enabled the creation of the “embedded liberalism” dynamics. It tied countries into multilateral mechanisms (e.g., regimes and organizations) to arguably reduce social inequalities, preserve domestic stability, reduce sources of conflicts, and safeguard international liberalization (Ruggie 1982). However, these all-pervasive Western-led normative elements ignored complaints of actors that lie beyond their ken (Strange 1982). From a Weberian perspective, modernity via capitalist relations would come only in societies that follow scientific understandings. Such a pervasive philosophical basis coaxed other states to set policies aimed at catching up with these Western values (Chang 2002; Zarakol 2010).

Such a context is relevant for suggesting the hypothesis of the Middle Power Trap. For that reason, international regimes can be considered instruments to preserve the order previously elaborated by great powers. The nonproliferation regime represents, for instance, a global effort to regulate a sensitive market of materials and cutting-edge technologies since these S&T-related elements could produce weapons. Despite having a noble aim, great powers encourage the spread of these rules after consolidating their national nuclear programs by investing in S&T policies to attain autonomy. They mastered these valorized techniques and established mechanisms that legitimized their actions (see the NPT). It unveils a third crucial

⁷⁵ There is considerable literature on the analytical myths of IR. It is not the purpose of this study to delve into this discussion, but many trivial assumptions (e.g., the born of the notion of sovereignty after the signature of the treaties of Münster and Osnabrück) are under historical review. See (Carvalho, Leira, and Hobson 2011).

⁷⁶ Latin American IR literature usually employs the concept imperialism to define the hegemony of great powers and, thereby, unpack the consequences of the world order to the interests of the periphery.

⁷⁷ Some readers can ask if it is possible to claim that this moment was a Western⁷⁷-led order due to the competition against the Soviet Union. The role of Moscow as a world order’s leadership is due to it was among the most important countries inside the Allied bloc during WWII and joined the three war conferences that shaped global mechanisms (Tehran (1943), Yalta (1945), and Potsdam (1945)) with the United Kingdom and the United States. Despite diplomatic skirmishes between Churchill and Stalin during these conferences, the Soviet Union acquiesced to the UN configurations and actively joined discussions over international issues (see Evangelista 1990). Such a context became evident during the *détente* (1967-1979) when decisions between Washington and Moscow⁷⁷ produced regimes and rules that affected the whole world (GADDIS, 1987; HOBBSAWM, 1995; MORGAN, 2011).

topic to this discussion: how this context connects to the discussion about emerging regional powers. Such a debate hinges on the dispute for status.

Firstly, the Middle Power Trap reduces postulant countries to the status of great power as traditional Middle Powers who acquiesced to earn reputational assets by embracing a prescribed diplomatic thought and assuming compromise positions in disputes. Otherwise, they risk being treated as inferior peers and have access to economic, diplomatic, and political privileges cut off (Lopes et al. 2020; Chang 2002; Zarakol 2010). To quote Smetana (2020, 41):

The sanctions are also frequently justified as a symbol of resolve of international community to punish the instances of deviance and thereby to maintain a general sense of justice in global governance, to strengthen the norm in question, and to deter future instances of norm violation.

The Western-led world order attempts to condemn emerging regional powers to an endless search for similar hierarchical positions of great powers. This goal remains a mirage as such in Camus' existentialist analysis of the Sisyphean myth. Emerging regional powers played the role of workers who repeat the same meaningless activities. When great powers require other states to meet their standards, they convey that the world order is a ladder where certain features lift actors to the next stage (see Gilady 2018). However, attempting to attain these standards by following the rules seems like rolling a boulder up the hill and noticing that all efforts were in vain. The side-effects of regimes demonstrate that world order is a set of exclusive groups where the most privileged class strive to preserve their status (DE CARVALHO, 2020).

The Middle Power Trap, therefore, is a causal mechanism that congregates the social aspects and material instruments (e.g., sanctions, use of force, or diplomatic isolation) employed to stigmatize and repress challenging actors. It, for example, exerts causal forces in the nuclear policies of countries that do not abide by regulatory initiatives such as the NPT. Such a repressive structural-level mechanism aims to reduce the odds of countries deciding to build nuclear facilities or use them for military-led ambitions. It is a deterministic fact. Whether it is effective or not depends on how able are states to cope strategically with the shame they are subjected to and international pressures (see Adler-Nissen 2014). In other words, imagine the following situation: great powers are house owners who set traps for rodents. Emerging regional powers are the mice attempting to reach a slice of cheese. Traps are there and planned to work properly. It is a fact. Yet, the results are uncertain. The chances are that a mouse is entrapped. There are skilled rodents who take the cheese or house owners can develop a peaceful relationship with one of these animals. Traps are planned to cope with expected behavior. Deviant cases can manage to overcome the hurdles imposed.

Previous works unpacked the social feature of status recognition in international relations (CASARÕES, 2020; DE CARVALHO, 2020, p. 20; LARSON; PAUL; WOHLFORTH, 2014; LARSON; SHEVCHENKO, 2014; RENSHON, 2017; WARD, 2017). Although great powers are defined according to their robust capabilities vis-à-vis other states, the social recognition of a state as a legitimate member of this club is a necessary condition. The UNSC members, for example, are countries that other agents assume as responsible to preserve global order. Sometimes, such ideational features became more relevant to consider a state than material force and diplomatic influence. There are cases in which a country was considered a great power without any evidence of objective elements.

Take the anecdotic evidence of the Paris Peace Conference in the aftermaths of WWI (see Brezina 2005). A group of sovereign states called the “Big Four”, composed of the United States, the United Kingdom, France, and Italy⁷⁸, held sway over the formulation of the Treaty of Versailles (1919). Was Italy a great power like the other three countries? In terms of material capabilities, it was not. During the negotiations of this treaty, for instance, Rome did not perform the same diplomatic role as the other three countries (MACMILLAN, 2007). However, other great powers assumed calling a European ally a similar peer was a good decision. Conversely, when emerging regional power attempt to engage in policies to obtain technological assets, these countries are considered bullies and threats.

In conclusion, the Middle Power Trap represents these side-effects sparked by the hegemonic attempt to preserve the status quo. It consists of a phenomenon triggered by existing rules, decision-making practices, and specialized agencies to regulate fields considered relevant to the world. During the post-WWII period, international regimes enact this mechanism. Hence, the production of valorized elements⁷⁹ (GILADY, 2018; O’NEILL, 2006) as sources of power and technological prowess became limited according to these supposedly peaceful-driven arrangements. Emerging regional powers try to catch up with great powers’ development policies to signalize their ascending status (Pu and Schweller 2014). Overall, they do not enjoy harmonious⁸⁰ relations with the highest stratum and, thereby, it does not receive the same kindly

⁷⁸ See also the Rapallo Treaty (1917) to establish the Supreme War Council. Italy was named a Great Power.

⁷⁹ Many previous works employed a Veblenian sociological approach to understanding the symbolic values of international assets. Therefore, the act of acquiring a subject holds an intrinsically communicative goal. Like in a humankind society, states look for valorized objects because they convey an idea of status. Many people are keen on acquiring a new brand Ferrari or an iPhone because there is a social awareness that those products are fancy elements owned by wealthy individuals. Countries, in this sense, try to satisfy their desires of prestige by accumulating assets that other agents assume as relevant in international life. See Gilady 2018.

⁸⁰ It does not mean these countries do not establish cooperative ties. Harmony is the complete congruence of interests between agents. Cooperation is defined as the possibility of solving differences by establishing

reception observed in Italy during WWI. Therefore, these countries challenge rules to master top-notch technologies and draw economic strategies. They became stigmatized by other states, and great powers and organizations apply sanctions against them (Ikenberry and Kupchan 1990; Zarakol 2010). Emerging regional powers are encouraged to acquiesce to the status of traditional Middle Powers (LOPES; CASARÕES; GAMA, 2020).

Since a regime comprises rules, decision-making procedures, agreements, and organizations that regulate an area, pieces of evidence that stress the centrality of great powers inside multilateral negotiations and other entities give a picture of this mechanism in action. Such order-keeping tools, in this sense, represent strategic complexes that constrain the relevance of potential rivals (see Modelski 1987). There is considerable literature that employs critical approaches to demonstrate the relevance of these agents in elements of regimes (ADLER-NISSEN; POULIOT, 2014; POULIOT, 2016). Hence, the Middle Power Trap suggests the existence of an international hegemony because it compromises legitimated manners to constrain challengers. It tries to accommodate countries via both subjective (stigmatization) and material mechanisms (e.g., sanctions and diplomatic isolation).

4.3. Concluding remarks

The Middle Power Trap is a theoretical construct I test as a hypothesis during this investigation. Since it relies on a marginalized school of thought in debates about the international regime, I will undertake an inductive study to find elements that could corroborate and refine this hypothesis. That being so, this chapter summarizes the principal characteristics of this causal mechanism and its historical consolidation process.

This hypothesis suggests that international regimes exist to preserve peace and stability during a given world order. For example, the nonproliferation regime aims to avoid the proliferation of fissile materials employed to build weapons of mass destruction. However, world orders crystalize hierarchical social dynamics whereby great powers sustain their privileged role. Whereas NWSs enforce rules that regulate the development of S&T policies in NNWSs, they do not make efforts to eliminate their nuclear arsenal. Thus, the Middle Power Trap originates from this controversial context where great powers possess valuable assets while working to limit access to other countries.

negotiations (see Axelrod and Keohane 2018). During the analyzed period, emerging regional powers established punctual cooperative relations with great powers. Yet, it does not mean that these states were allies or avoided disputes in the international relations.

Hence, the Middle Power Trap is a causal mechanism composed of international regime's instruments to regulate policies and markets. I suppose it can affect the development of emerging regional powers because these instruments minimize national incentives to advance on ambitions that challenge international understandings. In this sense, it exerts causal forces to make countries abide by rules and diplomatically behave like traditional Middle Powers. In the nuclear realm, the Middle Power Trap represents the instruments employed to pressure NNWSs (e.g., emerging regional powers) to abdicate their indigenous-led interests on S&T-related areas – discouraging investments and modernization of this essential field to promote the development.

Two caveats: (a) the Middle Power Trap is not necessarily the result of explicit collusion among great powers aimed exclusively to hamper the development of other countries. By preserving an existing world order, they encourage the establishment of instruments that produce side effects. Yet, this context legitimizes their proposed order and facilitates the stigmatization of contesting agents - who are often emerging regional powers (potential postulants to the status of great powers). (b) This causal mechanism hinges on the available instruments to make emerging regional powers emulate traditional Middle Powers in multilateral arenas. In this sense, great powers are legitimized agents to preserve international regimes and coordinate actions to punish deviant cases – independently of their purposes (e.g., the peaceful-led use of nuclear energy).

In this sense, I propose a two-time investigation. Firstly, I delve into the nonproliferation history to assess the existence of the aforementioned historical context. It tests a part of this hypothesis by attesting to the observation of elements that permit claiming NWSs held sway over the principal nonproliferation instruments (NPT), and this unequal system received endorsement from other countries as a global effort against sources of threats. After that, I investigate how Brazil (a typical case) coped with external causal forces to make these states acquiesce to the nonproliferation regime, during the Cold War. If the proposed hypothesis is correct, Brazil experienced some hardships in going forward with the S&T policy due to materialistic sanctions (i.e., direct and indirect ways) and ideational aspects (e.g., stigmatization). Both strategies aimed to reduce the national interests in S&T investments in the consolidation of a robust autonomous-led nuclear program.

5. THE MIDDLE POWER TRAP AND THE NONPROLIFERATION REGIME

This chapter reports the manuscript findings after proceeding with empirical investigation. They are disposed of in two sub-sections according to clustering criteria previously illustrated in Image 3. By qualitatively analyzing UNODA's volumes, I found pieces of evidence that attest first phase (enacting) revolved around the core interests of great powers, who led the initiatives to draw crucial mechanisms – notably the NPT. Secondly, I noticed that the nonproliferation mechanisms legitimized the NWSs' initiatives as robust responses to reduce the proliferation of the nuclear arms race (legitimation) so that they could act against rival understandings by activating the MPT. Although great powers did not move robustly forward towards complete disarmament of their atomic arsenals, these initiatives convinced other countries to abide by rules to regulate nuclear markets and S&T relations.

Hence, I propose the following division of this chapter. Firstly, I delve into the history of atomic scientific studies to demonstrate how nuclear technologies became valorized assets in international relations. I seek to demonstrate that the existence of the Middle Power Trap in the nuclear realm is expected due to the observed international dynamics. This section (5.1) is relevant by reporting that great powers set up S&T programs to master these technologies and enrichment cycles – employing a colonialist logic during the Cold War (e.g., exploding nuclear artifacts in Third World countries or using their natural resources). Likewise, this investigation pinpoints aspects that confirm great powers promoted their understanding of regulating this S&T field. The next section (5.2) depicts the process whereby the fundamental nonproliferation instruments were established. I demonstrate the relevance of great powers influence over this context by consolidating an international regime that reduced possible alternations in the global power distribution. The reported findings reinforced the confidence in the hypothesis of the Middle Power Trap.

It follows a third section (5.3) that depicts the NWSs' employed efforts to convince other countries to adhere to nonproliferation instruments (e.g., NPT). As I demonstrate, this context builds a social understanding favoring the nonproliferation regime as a peaceful-led initiative – although countries complained about the unequal decision-making process that left Third World voices unheeded. This legitimation enabled the possible stigmatization of challenging states. Finally, the section (5.4) summarizes these findings. By way of curiosity, readers come across data attesting the following findings during this chapter:

- The nonproliferation regimes, especially the NPT, did not impose substantial restrictions to the development of NWSs' S&T programs. These countries assumed voluntary commitments while NNWSs had to abide by restrictive norms;
- Nonproliferation mechanisms cemented hierarchical structures among states;
- The NPT does not prevent NWSs to provide technical nuclear support to each other and facilitate their S&T industry to find international markets in NNWSs – while discouraging the latter to foment national S&T initiatives;
- Nonproliferation initiatives were discriminatory and gave a false sense of security;
- Nonproliferation mechanisms hindered the access of countries to necessary assets for settling peaceful nuclear programs.

5.1. Nuclear Technology as a Valorized Asset in the International Relations during the Cold War.

Firstly, nuclear weapons figure as crucial assets to international politics during the Cold War. Deterrence, Mutual Assured Destruction, and Second-Strike Capability are critical terminologies for IR studies about this era because of nuclear artifacts' impressive level of destruction (Cox 1990; Gaddis 2006; Kissinger 1960, 1994). Security-led IR literature about the Cold War usually emphasizes the outstanding defensive objectives pursued by states: build bombs to achieve a tremendous destructive capacity to dissuade menaces or impose severe damages to a rival (see Lebow and Stein 1995; Morgan 2011; Reiter 2014; Sagan 1994; Waltz 1981).

Even before the Cold War, the United States, in cooperation with Canada and the United Kingdom, engaged in the Manhattan Project to manufacture these weapons in a race against Nazi Germany. Therefore, analysts coded nuclear studies as “Big Science” during the Cold War (see McLauchlan and Hooks 1995). According to historians, this concept means scientific fields that received considerable private and public funding to provide advancements in strategic areas (McLauchlan and Hooks 1995). Whereas nuclear studies demonstrated it improved humankind's well-being in a broad range of areas (e.g., treatments and food safety procedures), states employed this knowledge to produce weapons that recoiled people in horror after the bombardment of Hiroshima and Nagasaki (1945). Works from Rutherford, Bohr, Heisenberg, Marie Curie, and Schrödinger, for example, provided many goodies to human beings and contributed to the development of nuclear bombs.

The Manhattan Project, at its peak, employed 130.000 workers and received more than US\$ 2 billion (Fehner and Gosling 2012). Astonishing results in military and energetic terms encourage other states to delve into research of uranium and other minerals. In this sense, the United States assembled the first artificial nuclear reactor to conduct research (Chicago Pile-1) in 1942, and the Soviet Union and the United Kingdom inaugurated the initial nuclear energy plants during the 1950s. Costs and technical sophistication to attain this technological-savvy spread an awareness that these elements could create new cleavages among states: between those endowed with nuclear knowledge and others who did not. The Soviet Union, for example, detonated its first nuclear explosive in 1949. The United Kingdom (1952), France (1960), and China (1964) followed it.

Despite the appalling event that occurred in Hiroshima and Nagasaki when the United States unveiled the destructive potential of fission uranium-235 (U^{235}) and plutonium-239 bombs (Pu^{239}), many states set up scientific programs to master nuclear technologies to build atomic weapons. During the 1950s, S&T policies linked to nuclear affairs and agreements popped up globally. Scientists and military officials sophisticated these technologies and detonated bombs that are more lethal. Warlike strategies and conceptions, for example, changed completely since a country could vanish a rival in a bombing (Aron 1967).

Other elements became a source of studies beyond uranium, such as hydrogen and thorium. Bombs deployed in Japan during WWII were less powerful than the explosive testing of Castle Bravo, based upon a fusion-related technology applying lithium-deuteride fuel, conducted by the United States in the Bikini Atoll (Marshall Islands) in 1954, or the Tsar Bomb, exploded by the Soviet Union in 1961. Table 2 illustrates the progression of nuclear tests during the pre-NPT to demonstrate that some states engaged in a scientific race to learn about the potential of these technologies. It considers only tests performed by countries that attained the goal of exploding nuclear artifacts (for peaceful or military reasons) until the NPT entry into force.

Table 2 – Nuclear competition among countries

Countries/Year	United States	Soviet Union	United Kingdom	France	China
1945	1	-	-	-	-
1946	2	-	-	-	-

1947	-	-	-	-	-
1948	3	-	-	-	-
1949	-	1	-	-	-
1950	-	-	-	-	-
1951	16	2	-	-	-
1952	10	-	1	-	-
1953	11	5	2	-	-
1954	6	10	-	-	-
1955	18	6	-	-	-
1956	18	9	6	-	-
1957	32	16	7	-	-
1958	77	34	5	-	-
1959	-	-	-	-	-
1960	-	-	-	3	-
1961	10	59	-	2	-
1962	96	79	2	1	-
1963	47	-	-	3	-
1964	45	9	2	3	1
1965	38	14	1	4	1
1966	48	18	-	7	3
1967	42	17	-	3	2
1968	56	17	-	5	1

Source: elaborated employing data from Arms Control Association (2020).

In this sense, nuclear technology became a valorized military asset that mobilize a competition among great powers in the S&T field. It was a matter of prestige in the scientific world. Acquiring such a weapon via indigenous efforts in the technological field conveys to other agents an impression of strength and ability to attain cutting-edge achievements. Other states attempted to emulate and catch up with these technological advancements. In light of this, agents interacted with each other and started to valorize the achievements of this weapon by a member – namely the United States. Since Washington showed the world its technological developments to train scientists and employ resources, other agents valorized this innovation. Nuclear energy sparked fascination in scientists from S&T projects in other states (Spektor 2020). In so being, it is important to mention that this S&T-related competition among states also hinged on peaceful-led issues – for example, energy production and cutting-edge equipment designing.

Enterprises consolidated technological structures to build nuclear reactors (e.g., PWR; Candu; BWR; HWGCR; Magnox; HWR). During the 1960s, the United States and the Soviet

Union, for example, advocated for nuclear reactors that employed enriched uranium – differently from France and the United Kingdom who endorsed the work of these machines via natural uranium⁸¹. Companies from the United States engaged in research on the use of PWR with enriched uranium to also apply these technologies in naval and submarine plans and develop sophisticated portable electric mechanisms⁸². Washington, thereby, supported the diffusion of such technology via subsidizing their companies and establishing diplomatic efforts (Wrobel 1992). Paris, on the other hand, preferred such a technology moderated with graphite because of a political decision to avoid the enrichment phase of uranium. As illustrated in the Table 4, different states employed technologies to set their nuclear systems during the 1950s – the beginning of the Cold War:

Table 4 – List of States that set nuclear reactors during the 1950s.

State	Technology	Year of the first reactor ⁸³
Sweden	BWR and HWR	1958
West Germany	BWR and PWR	1958
Japan	Import of BWR, PWR; AGR and HWGCR	1959
Italy	Magnox, BWR, and PWR	1958
Canada	PHWR	1955
East Germany	PWR	1957
Czechoslovakia	HWGCR	1957
United States	BWR and PWR	1953
Soviet Union	PWR and graphite moderator for BWR	1952
United Kingdom	Magnox and AGR with FBR	1953
France	PWR and HWGCR	1953

Source: Data extracted from Costa (1967).

This S&T dimension is important to the dissertation since it triggered scientific dynamics in the other countries than great powers – for example, promoting the opening of academic departments on chemistry, physics, and engineering around the world. In Brazil, for example, the government, during the 1950s, debated the necessity to build new laboratories and

⁸¹ Proceedings of the Third International Conference on the Peaceful Uses of Atomic Energy. United Nations held in Geneva (31st August – 9th September, 1964).

⁸² U.S. Congress. Hearing before the Joint Committee on Atomic Energy Congress of the United States on Review of Naval Reactor Program and Admiral Rickover Award (11th April, 1959).

⁸³ Robust reactors to produce energy or to build weapons.

establish agencies regarding nuclear studies⁸⁴. Classes on nuclear physics were introduced in the Brazilian Navy School (Patti 2012). In South Africa, universities invested in studies to enhance national capabilities on mining and separation of uranium from gold ores. National institutes of physics and biophysics undertook analyses about the effects of radiation in human bodies⁸⁵. Likewise, Indian government created the national AEC and the Atomic Energy Research Committee, during 1940s, to foment indigenous scientific studies and partnerships with private institutions (i.e., Tata Institute) to master related techniques on physics, chemistry, engineering, and metallurgy⁸⁶ (Abraham 1998; Perkovich 2001).

This scientific field would work to enhance national development and, thereby, provide public goods to local people (Saha 1945). Other states (e.g., Egypt, Indonesia, Sweden, and Switzerland) conducted, in the beginning of the Cold War, researches to explore uses of nuclear energy (Asuelime and Adekoye 2016; Siracusa and Warren 2018). Italy launched a nuclear program seeking also to preserve territorial sovereignty via producing missiles regardless the 1947 Peace Treaty that prohibited Roma to produce atomic weapons (Nutti 2007).

The Cold War was a period of technological disputes between great powers. The historical literature enhances the confidence on the hypothesis that nuclear technology was also a matter of scientific dispute because this era was marked by a technological competition (Gaddis 2006; McDougall 1985; Needell 2013). The space race sparked an astonishing competition between Moscow and Washington. For example, when the Soviet Union launched the Sputnik in 1957 and Yuri Gagarin completed a journey around Earth in 1961, the United States boosted its national spatial program to enable the Apollo XI to land on the moon in 1969. It became a symbol of scientific prowess and served to buttress their legitimated status of great powers (Musgrave and Nexon 2018). Nuclear assets were the same and it was also related to exploration of outer space since great powers (e.g., the United Kingdom, the United States, and the Soviet Union) assumed, in 1967, to not conduct explosions there⁸⁷. Other states attempted to emulate great powers because they noticed not only the potential of this source, but also the prestige granted to those who handled it. Such an assumption was illustrated by the Irish diplomacy in 1959:

⁸⁴ See letter from F.J. Maffei (Department of Chemistry of USP) to the Admiral Álvaro Alberto (10th December, 1952); *Informações Gerais Sobre o CDTN da Nuclebrás* (April 1974); Brazilian law n° 1310 of 15th November, 1951.

⁸⁵ Speech delivered by W.C. Du Plessis, leader of the South African delegation, to the Conference on the Statute of the International Atomic Energy Agency.

⁸⁶ See Nuclear India, Magazine published by the Department of Atomic Energy. Government of India in 2003.

⁸⁷ See Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies (27th January, 1967).

As delegates are aware, plutonium, which is the fissionable core of some nuclear weapons, has for some years been obtained as a by-product of one type of nuclear electric power station. Nuclear reactors of this type are in course of erection in countries not producing nuclear weapons. More are projected. Countries which may build this type of electric power plant mainly to keep their industrial potential and technical experience abreast of the times, will find themselves with the basic material for nuclear weapons on their hands. It will become increasingly hard for the Governments of these countries to resist domestic pressure to take the further step of producing nuclear weapons. They will be pressed to do so on the grounds of economy and security if not for considerations of prestige⁸⁸.

Consequently, during the Cold War, antagonistic poles worked to master nuclear-related technologies to modernize different sectors from their army and economy. The 1958 Agreement between the United States and the United Kingdom on Mutual Defense included the usage of atomic energy and allowed the exchange of information and transfer of nuclear submarine propulsion technologies. These machines offered many technical advantages compared to oil-fueled ships. Although discussions held in the UN claimed prestige of state could not be coupled with national disputes over the usage of nuclear energy to produce arms or military-related assets⁸⁹, such elements assumed a prominent role in international relations. Hence, these aspects demonstrated that nuclear energy was a valorized element during the Cold War. It became a synonym of technological development and modernization (Perkovich 2001). Additionally, it reinforced a sense of sovereignty over the energy production necessary to the industrialization and the increase of urban population.

To sum up, there are elements attesting that international relations valorized nuclear assets as a symbol of S&T development to leverage national development, during the Cold War. Some crucial aspects to affirm this are:

- Atomic technology was considered a new source of energy with unexplored potentials;
- The Cold War was a period marked by an S&T race between great powers – including the nuclear field.
- This field opened new markets that promoted innovation via the development of technologies such as reactors;
- Mastering the nuclear fuel cycle could make states less dependent on the importation of crude oil or coal;
- Scientists and politicians claimed nuclear energy symbolized a source of prestige to the state.

⁸⁸ Statement by the Irish Foreign Minister (Aiken) to the First Committee of the General Assembly, November 13th, 1959.

⁸⁹ Declaration of the Soviet Government on General and Complete Disarmament (19th September, 1959).

For the purpose of this dissertation, it is relevant to understand the links between this dimension and the S&T policies of emerging regional powers. I report these connections as follows.

- (a) Many policymakers and scientists claimed it could enable economic development via energy production or using these materials directly to improve agricultural techniques (e.g., fertilization), industry, and medical procedures. Many countries – specially emerging regional powers - grasped it could safeguard energy sovereignty and demonstrated to other agents their full-fledged scientific sophistication (Eyre and Suchman 1996; de Lima 1986). For instance, Brazil and India affirmed, during the beginning of the Cold War, that atomic energy worked to preserve energetic autonomy and reduce the gap with great powers in terms of scientific and economic realms (Patti 2012; Perkovich 2001). In so being, it is reasonable to expect that restricting the accesses of countries to nuclear scientific development would face resistance due to this intrinsic relationship with energetic autonomy and scientific achievements⁹⁰.
- (b) It was a sort of element to earn social prestige⁹¹. In 1967, the Secretary-General U Thant prepared a report requested by the UNGA⁹² explaining the effects of the use of nuclear weapons and economic implications. This document claimed that a hypothesis behind nuclear proliferation was that some countries believed these technologies would promote political independence, prestige, and influence⁹³. A well-known example, in the literature, is the case of Charles De Gaulle who advocated for French nuclear tests to reinforce the status of the country as a great power⁹⁴ (Vaïsse 2014; Waltz 1981). Likewise, the scientist and AEC Chairman Homi J. Bhabha wrote to Prime Minister Nehru, in 1960, that technical ability to explore the potentials extracted from plutonium

⁹⁰ Discurso Pronunciado pelo Ministro Magalhães Pinto na Segunda Parte da XXII Assembleia-Geral das Nações Unidas sobre Não-Proliferação Nuclear. Available at CPDOC-FGV (Acervo Paulo Nogueira Batista). (3rd May, 1968).

⁹¹ Peiping People's Daily Editorial on Nuclear Disarmament, (22nd November, 1964); Report of Secretary-General Thant on the Effects of the Possible Use of Nuclear Weapons and on the Security and Economic Implications for States of the Acquisition and Further Development of These Weapons, October 10, 1967; Statement by the Indian Representative (Trivedi) to the Eighteen Nation Disarmament Committee: Nonproliferation of Nuclear Weapons (23rd May, 1967); Television Interview with Secretary of State Rusk: Communist China and Nuclear Weapons {Extract}, (18th October, 1964).

⁹² A/RES/2162 A (XXI).

⁹³ Report of Secretary-General Thant on the Effects of the Possible Use of Nuclear Weapons and on the Security and Economic Implications for States of the Acquisition and Further Development of These Weapons, October 10, 1967

⁹⁴ Charles de Gaulle sur les essais nucléaires en Polynésie (16th September, 1966).

would show India's technological development and enhance political prestige⁹⁵. Mastering procedures to handle nuclear energy would enhance Indian sovereignty, according to Bhabha⁹⁶.

- (c) Another evidence of the relevance of nuclear energy was the dispute to restrict access to these technologies. During the 1940s, the United States employed efforts to preserve the monopoly over nuclear energy and curb espionage – a pervasive fear that followed the history of nuclear proliferation. For instance, the Atomic Energy Act of 1946, signed by Truman, imposed severe limitations to the diffusion of related technologies and radioactive materials (Patti 2012). This act prohibited exchange of information even to traditional allies of the United States, like the United Kingdom and Canada (Baylis and Stoddart 2012). Likewise, it imposed severe restrictions to US citizens in providing assistance to nuclear program overseas⁹⁷. Such created rifts among great powers. In addition, these restrictions made mastering atomic energy difficult and, thereby, only great powers would be able to overcome these hurdles and defy Washington's monopoly.

This topic (c) is the most relevant in geopolitical terms. The initial attempts from the United States to provide international control over atomic assets caused reticence among other states. The Baruch Plan⁹⁸, in 1946, was the first consolidated project that Washington introduced in the United Nations to encourage the renunciation of the bomb, create a system for control of atomic energy, and considered violations of nuclear rules as international crimes. In addition, this initiative aimed to establish a global authority to concentrate information about nuclear technologies, inspect national policies, and control mining activities and distribution of these elements according to an international coefficient. It would represent an ambitious attempt to require states to concede parts of their sovereignty to a supranational authority drawn by the United States plan. The United States Representative to the UNAEC pointed out:

It has been attacked on the ground that it would take away some of the sovereign rights of the nations which accepted it. This is true. Each nation would be deprived of the right to compete with other nations

⁹⁵ Note, Homi Bhabha to Shri Y.D. Gundevia – Confidential - PM'S Sectt. U.O.No.17(302)/60-PMS dt. 5.9.60 (5th September, 1960).

⁹⁶ Letter from Homi Bhabha to Sir Dorab of Tata Trust (12th March, 1944).

⁹⁷ The United States. Atomic Energy Act of 1946. Public Law 585 – 79th Congress Chapter 724 – 2nd Session. S.1717. (1946). In: Atomic Archive. <https://www.atomicarchive.com/resources/documents/deterrence/atomic-energy-act.html>

⁹⁸ Plan: Statement by the United States Representative (Baruch) to the United Nations Atomic Energy Commission (14th June, 1946).

to see which could amass the greatest quantities of atomic materials which can be used either as explosives or, at some later date, for the production of power⁹⁹.

This plan aimed to solve a demand and supply problem related to nuclear materials. Whereas countries as Brazil¹⁰⁰, Australia, South Africa¹⁰¹, Canada, India and Belgium (due to its erstwhile colony Congo) had acknowledged reserves of atomic materials, great powers with sophisticated nuclear projects relied on importation (Rocha Filho and Garcia 2006). Hence, less developed countries shared some concerns about this proposal to correct international distribution of atomic raw materials, which were sources of revenues due to exportation. For example, the United States, in 1946, was not aware about their main mines of uranium – this country only knew the existence of reserves of carnotite in Colorado. It relied on exportation of materials (e.g., monazite sands and uranium ore).

Different raw materials became relevant sources to obtain atomic power. During 1956 to 1977, many new sources of minerals became available. Beyond thorium (Th), other minerals received attention: zirconium, niobium, and other rare earths. Table 3 depicts this context where many countries engaged in uranium mining to supply demands for this raw material prior to the NPT.

Table 3- Uranium production prior 1970 per country

Country	Tons of Uranium
Argentina	79
Australia	7546
Canada	85200
Finland	30
France	14100
Gabon	3460
Western Germany	108
India	1000
Japan	2
Mexico	42
Portugal	1364
South Africa	55046
Spain	55

⁹⁹ Statement by the Deputy United States Representative (Osborn) to the United Nations Atomic Energy Commission, July 20, 1949.

¹⁰⁰ Washington, for example, to advance its researches over nuclear energy set diplomatic efforts, during the 1940s, to access reserves of fissile and fertile materials (uranium and thorium) from Latin American countries

¹⁰¹ Memorandum of Conversation Regarding Eximbank Loan to South Africa (2nd September, 1949).

Sweden	178
United States	142800
Zaire	25600

Source: Data compiled by (Horiuchi and Gehrisch 1989).

Therefore, this context mobilized nuclear-related markets and motivated political and scientific interests over these strategic minerals. Despite of world's peaceful-minded claims to regulate this field and curb nuclear threats, many scientists and political agents were not keen on completely forestalling technological studies over nuclear issues or even reducing profits earned due to the trade of raw materials and equipment¹⁰². During the WWII, for example, the United States used resources from the Lend-Lease Act to acquire tons of iron, tungsten, monazite sand, uranium from other states and promised to enhance their infrastructure facilities (e.g., mining sights and railroads)¹⁰³. In so being, the United States diplomacy noted that states like Brazil and Australia would make reservations to global initiatives that regulate this sort of market by establishing global control of atomic material deposits¹⁰⁴.

Although Washington insisted that geopolitical issues did not motivate the Baruch Plan¹⁰⁵, aspirations to master nuclear energy led some countries to develop uneasiness over initiatives that could deprive them of these assets. Soviet Union claimed this plan sought to maintain the dominance of Washington in the field of atomic energy¹⁰⁶. Brazilian agents¹⁰⁷ considered this idea would be fair only if other sources of fossil fuels (e.g., crude oil, coal, or natural gases) were put under the same authority of this international institution. Baruch Plan's critics claimed this project hinged on an absurd: an idea that a "natural inequality of resources distributions" where the most developed countries were arguably harmed by such a context because their industries and technological developments had to import raw materials¹⁰⁸.

¹⁰² See: O Setor Nuclear Brasileiro e a Indústria Nuclear do Brasil S.A. – 1NB. 1948. (Document obtained at FGV/CPDOC archive from Paulo Nogueira Batista library); Memorandum from J.K. Gustafson to C.L. Wilson Gustafson's Conversation with Anton Gray. Top Secret document from South Africa and the United States diplomacy in 26th May 1948; South African Cabinet Memorandum, Research in the Field of Nuclear Energy and Exchanging Information with Friendly Nations (1956) – translated to English by the Woodrow Wilson Institute. Also, secondary sources shed light on India about this topic: Bhatia 1979; Perkovich 2001.

¹⁰³ Washington, Acordos De. In: FGV CPDOC.

¹⁰⁴ Memorandum of Telephone Conversation, by the Chief of the Division of International Security Affairs (Johnson) – Secret – Washington (13th June, 1947 -9:30 a.m.).

¹⁰⁵ Address by the United States Representative (Baruch) to the United Nations Atomic Energy Commission (5 December, 1946).

¹⁰⁶ Statement by the Soviet Representative (Gromyko) to the Security Council, 5th March, 1947.

¹⁰⁷ O Setor Nuclear Brasileiro e a Indústria Nuclear do Brasil S.A. – 1NB. 1948. (Document obtained at FGV/CPDOC archive from Paulo Nogueira Batista library).

¹⁰⁸ See "Minutes of the Tenth Session of the Brazilian National Security Council, Alvaro Alberto's proposal to establish a Brazilian Atomic Energy Program," August 27, 1947, History and Public Policy Program Digital

Hence, this dispute for raw material access and the development of new technologies sparked the initial diplomatic skirmishes in the field in tandem with the different ideas to promote nuclear disarmament. These debates about regulating nuclear-related markets to advance S&T programs in great powers directly mobilized the diplomacy of Global South countries. The Baruch Plan was rejected via efforts played by countries such as Brazil (see more in chapter 6). However, aspects from this plan persisted during further steps (e.g., the idea of a regulatory agency to supervise nuclear policies). This proposal to establish an international agency was reinforced by the United States¹⁰⁹, in 1953, and thereby it provided basis for the conclusion of the IAEA¹¹⁰ in 1957. Washington insisted that a regulatory mechanism to control the stockpiles of uranium and thorium was necessary to control nuclear activities, as demonstrated during session, in 1952, of the Disarmament Commission:

The studies of the United Nations Atomic Energy Commission established the necessity for international control and allocation of the quantities of uranium and thorium which are to be separated from their place in nature, the time and place of the further processing and purification of source materials, and the size, use and disposition of working stocks and stocks in transit. Without such comprehensive international control of the flow of source materials from the first point where they are capable of being diverted, there would be serious risk of the diversion of source material or of the accumulation of stocks with a view to subsequent dispersion or seizure¹¹¹.

The foundation of IAEA hinges on this context due to the establishment of a safeguard system that covered reactor facilities (INFCIRC/26 Add.I), reprocessing plants (INFCIRC/66/Rev.1) and the usage of nuclear materials (INFCIRC/66/Rev.2) – mechanisms developed since 1961 (INFCIRC/26)¹¹². This agency established formal ties with UN through INFCIRC/11 (1959)¹¹³. In so being, the Soviet Union started to support such a proposal:

In 1953 President Eisenhower proposed the formation of the International Atomic Energy Agency with the dual task of promoting peaceful nuclear programs and providing safeguards against these programs being used as steppingstones to nuclear-weapons systems. This Agency came into being in 1957. It now has 98 members. Although initially skeptical, the Soviet Union has become a strong supporter of the IAEA and its safeguards system¹¹⁴.

Archive, National Archive (Brasilia). Obtained and translated by Fundação Getúlio Vargas. <https://digitalarchive.wilsoncenter.org/document/11691>

¹⁰⁹ United States "Atoms for Peace" Proposal: Address by President Eisenhower to the General Assembly (8th December, 1953).

¹¹⁰ A/RES/1145 (XII).

¹¹¹ Statement by the Deputy United States Representative (Cohen) to Committee I of the Disarmament Commission (14th May, 1952).

¹¹² See IAEA Information Circular. INFCIRC/66/Rev.2 (16th September, 1968).

¹¹³ IAEA. Information Circular INFCIRC/11. (30th October 1959).

¹¹⁴ Address by Secretary of State Rusk to the Fordham University Club of Washington (2nd May, 1968).

The IAEA aims to control the use of atomic energy for military purposes and promote its employment to produce energy and scientific researches. As described in the Article II of the statute:

The Agency shall seek to accelerate and enlarge the contribution of atomic energy to peace, health and prosperity throughout the world. It shall ensure, so far as it is able, that assistance provided by it or at its request or under its supervision or control is not used in such a way as to further any military purpose (IAEA 2022).

Such debate about the establishment of nonproliferation mechanisms will be addressed in the next section. From observed elements during this chapter, I can infer that nuclear-related technologies were valorized assets in international relations during the Cold War. It was due to the acknowledged military purpose, scientific prestige, and commercial interests. In this sense, the possible dual-use of fissile materials encouraged international responses to avoid a nuclear hecatomb. As I demonstrated, the problem is that these debates occurred in the middle of an S&T-related race among great powers and hinged on unequal power dynamics. In this sense, this section (5.1) increased the confidence in the existence of a Middle Power Trap in the nuclear field because the international social context encouraged the valorization of atomic technologies.

5.2. Enacting Phase: the Influence from Great Powers over the Establishment of Nonproliferation Instruments (e.g., NPT).

Modern Western-led world orders (i.e., *Pax Britannica* and *Pax Americana*) championed diplomatic agreements as mechanisms to constrain arms race and the employment of military force to solve international problems. Such a Grotian-minded perception encouraged states to draw binding commitments to regulate weapons production. Since the 19th century, international negotiations systematically addressed the links between military-related topics and scientific advancements. The Declaration of St. Petersburg of 1868, the Declaration of the Brussels Conference of 1874, the Convention of The Hague Peace Conferences of 1899 and 1907, and the Geneva Protocol of 1925 were initial international attempts to outlaw the development and use of specific arms (UN 1970). Such initiatives assembled growing technological developments with historical attempts to define rules of warfare activities and arms control (see Coe and Vaynman 2020; Walzer 2015).

Since nuclear technologies represent a revolutionary novelty for warlike and scientific issues (section 5.1), it is reasonable to imagine that agents pushed for a regulating system to avoid disasters and promote peaceful-led use. A wide range of states advocated the establishment of nonproliferation regulations. Since the beginning of the Cold War, documents

issued by non-governmental organizations¹¹⁵ and the Holy See¹¹⁶ encouraged these negotiations. Prior to the NPT's entry into force, I identified 98 resolutions at the UNGA about disarmament, nuclear energy, production of atomic energy, mechanisms of verification, weapons of mass destruction, and the process of mastering nuclear technologies. Table 4 listed these multilateral initiatives to demonstrate that it is not simple to affirm great powers enjoyed a special role within these multilateral negotiations – all UN members were invited to join them.

Table 4 - List of UNGA Resolutions related to the nonproliferation regime

Year/Session	A/RES/
1946(I and II)	1; 41; 42
1948(III)	191; 192
1949(IV)	299; 300
1950(V)	380; 381; 496
1952(VI)	502; 504
1953(VII)	704
1953(VIII)	715
1954(IX)	808; 810
1955(X)	912; 913; 914
1957(XI)	1011
1957(XII)	1145; 1148; 1149; 1150
1958(XII)	1252; 1347; 1348
1959(XIV)	1376; 1378; 1379; 1380; 1402; 1403; 1472
1960(XV)	1516; 1576; 1577; 1578
1961(XV)	1617
1963(XVI)	1629; 1632; 1648; 1649; 1652; 1963; 1660; 1664; 1665; 1721; 1722
1962(XVII)	1762; 1764; 1767; 1801; 1837
1963(XVIII)	1884; 1896; 1908; 1909; 1910; 1911; 1931; 1962
1965(XX)	2028; 2030; 2031; 2032; 2033; 2078; 2092
1966(XXI)	2149; 2153; 2162; 2163; 2164; 2165; 2222
1967(XXII)	2286; 2289; 2340; 2342; 2343; 2344; 2346
1968(XXII)	2373
1968(XXIII)	2382; 2387; 2454; 2455; 2456; 2467
1969(XXIV)	2496; 2499; 2526; 2602; 2603; 2604; 2605

¹¹⁵ See World Peace Council. *'Stockholm Appeal of the World Peace Council'* In: Documents on Disarmament 1945-1959 Volume I (1950).

¹¹⁶ Holy See. *'Letter From Pope Paul VI to Secretary-General Thant'*. (ENDC/136). In: Documents on Disarmament 1966 (1966).

Source: own elaboration

Convening a world conference about this topic, as proposed by the Conference of Non-Aligned Countries in 1965, received prompt support from the 89 UNGA members – only 16 countries abstained from voting, *e.g.* the US, South Africa, Israel, and France¹¹⁷. Even states that refused to join the NPT during the Cold War endorsed these efforts. For instance, Brazil¹¹⁸, India¹¹⁹, Pakistan¹²⁰, and South Africa¹²¹ favored the coming into force of a nonproliferation treaty that comprised all states, contemplated a system of guarantees that could enable the usage of atomic energy for peaceful goals, and promoted the proscription of nuclear weapons.

These demands also came from non-state agents. Nuclear-related experiments triggered international health and environmental problems (*e.g.*, the polluted Lake Karachay in the Soviet Union due to radioactive waste). Tests were conducted in different parts of the world and, thereby, exposing people to radioactive contamination and toxic gaseous particulate¹²². As long as states decided to explode artifacts to enhance their knowledge about nuclear energy, they conducted experiments in new sights. Colonial power used areas in their territories or former colonies. For example, there were sights in Algeria, Kazakhstan, Australia, and Pacific Islands, although these countries did not establish robust nuclear projects. The United States, in 1958, conducted a series of high-atmosphere tests – so called Project Argus - in the South Atlantic which interfered in radio waves and increase the number of toxic particles of the radioactive isotope Strontium-90 (⁹⁰Sr) in the atmosphere (Sullivan 1959).

Non-aligned movement asked states to stop these experiments¹²³. African countries raised grievances against possible effects of French tests in the continent¹²⁴. But there were

¹¹⁷ Disarmament Commission. ‘*Disarmament Commission Resolution on World Disarmament Conference*’. (DC/224). In: Documents on Disarmament 1965 (1965).

¹¹⁸ Brazil. ‘*Statement by the Brazilian Representative (Correa da Costa) to the Eighteen Nation Disarmament Committee: Peaceful Uses of Nuclear Energy, May 18, 1967*’. (ENDC/PV.297) In: Documents on Disarmament 1967 (1967).

¹¹⁹ India. ‘*Statement by the Indian Representative (Trivedi) to the Eighteen Nation Disarmament Committee: Nonproliferation of Nuclear Weapons*’. (ENDC/PV.334). In: Documents on Disarmament 1967. (1967).

¹²⁰ Pakistan. ‘*Statement by the Pakistani Representative (Ali) to the First Committee of the General Assembly: Nonproliferation of Nuclear Weapons and Proposed Conference of Nonnuclear Countries*’. (A/C.1/PV.1442) In: Documents on Disarmament 1966. (1966)

¹²¹ South Africa. ‘*Statement by the South African Representative (Botha) to the First Committee of the General Assembly: Nonproliferation of Nuclear Weapon*’. (A/C.1/PV.1571). In: Documents on Disarmament 1967 (1967).

¹²² Draft Resolution Introduced in the First Committee of the General Assembly by Canada, Japan, and Norway: Registration of Nuclear Tests With the United Nations, (18th January 18 1957); Address by Secretary of State Rusk to the Fordham University Club of Washington (2nd May, 1968); Report of the Ad Hoc Committee To Study the Peaceful Uses of the Sea-Bed and the Ocean Floor Beyond the Limits of National Jurisdiction (30th August, 1968); Statement by ACDA Director Foster to the First Committee of the General Assembly (19th November, 1968).

¹²³ Communique of the Bandung Conference of Afro-Asian Countries [Extract] (24th April 24 1955).

¹²⁴ A/RES/1652 (XVI).

many cases of contamination throughout the world – for example, the crew from the Japanese fishing boat Lucky Dragon in 1954, citizens from Nevada and Utah (United States)¹²⁵, or the Tahitian people during the French tests¹²⁶. UNGA addressed the pernicious dynamics and the effect of radiation¹²⁷.

Scholars alerted to side effects of radiation in human body before the set of nuclear weapons tests. For instance, the IRC, founded in 1896, and the ICRP¹²⁸, established in 1928, began to conduct researches to delve into medical hypotheses about harmful potentiality to living organisms. In light of this, UNSCEAR¹²⁹ and issued periodic reports since 1958 to the UNGA claiming that this increase of man-made radiation exposed people to dangerous and unknown risks that could affect even future generations and food production¹³⁰. In addition, scientists issued manifestos warning of the perils of undertaking nuclear explosions and their use for military-led ambitions – e.g., the Russell-Einstein manifesto in 1955 or the Szilárd petition aimed to demand the US to inform Japan about the might of a nuclear weapon before proceeding with the bombing in 1945.

Likewise, this context sparked actions from social transnational movements (e.g., Pugwash Conference on Science and World Affairs and the World Peace Council¹³¹) and scientific committees. Nuclear threat was widespread throughout societies due to movies in an era of globalization. Media outlets and IR practitioners covered nail-biting episodes such as the

¹²⁵ A curiosity about this is the case of the cast who was filming the movie *The Conqueror* in 1956. It is the deadliest episode in the history of cinema. Many members from the crew of *The Conqueror*, years later, developed cancer. This movie was filmed in St. George County, Utah. Studies demonstrated that the wind from nuclear tests in Nevada exposed people there to dangerous doses of radiation. There is a great likelihood that these people faced diseases triggered by nuclear tests.

¹²⁶ Report of the United Nations Scientific Committee on the Effects of Atomic Radiation (Extract), 13th June 1958).

¹²⁷ See: A/RES/913(X); A/RES/1347(XIII); A/RES/1896(XVIII); A/RES/2078(XX).

¹²⁸ Report of the United Nations Scientific Committee on the Effects of Atomic Radiation (Extract), (13th June, 1958).

¹²⁹ To understand the goals of these nonproliferation regimes, see Annex 1.

¹³⁰ A/RES/1147 (XII); A/RES/1347 (XIII); A/RES/1376 (XIV); **UNSCEAR 1958 Report**: "Report of the United Nations Scientific Committee on the effects of atomic radiation"; **UNSCEAR 1962 Report**: "Report of the United Nations Scientific Committee on the effects of atomic radiation"; **UNSCEAR 1964 Report**: "Report of the United Nations Scientific Committee on the effects of atomic radiation"; **UNSCEAR 1966 Report**: "Report of the United Nations Scientific Committee on the effects of atomic radiation"; **UNSCEAR 1969 Report**: "Report of the United Nations Scientific Committee on the effects of atomic radiation".

¹³¹ Stockholm Appeal of the World Peace Council, (19th March, 1950); Warsaw Resolution of the World Peace Council, (22nd November 1950). The United States claimed this movement was arguably a Soviet Union's partner.

Suez Crisis (1956) or the Cuban Missile Crisis (1962)¹³² in which the world was on the brink of witness the trigger of military-purposed nuclear explosions (Allison 1999).

Despite this apparently global consensus, power dynamics and economic and diplomatic influences mold international relations. The problem resides on how to regulate this S&T subject without disturbing the interests of agents. Prior initiatives, during 1900s and 1910s, officially aimed to enhance cooperative ties among states by restricting S&T development to peaceful-ends roused contestation from many countries. Such legitimization of unequal international relationships disappointed these states - like Brazil. For instance, Rui Barbosa, Brazilian delegate in the 2nd Conference of Hague (1907), and Barão de Rio Branco, erstwhile Minister of Foreign Relations of Brazil, exchanged telegrams claiming these negotiations worked to cement the supremacy of great powers due to proposed ideas of granting a distinct role to countries with considerable military forces¹³³.

Brazil did not acquiesce naturally to the initiative of being a second-tier state vis-à-vis some European countries and the United States¹³⁴. During this conference, Asian and Latin American¹³⁵ states criticized authorities from the United Kingdom, the US, and Germany. These powers employed diplomatic strategies to establish an international justice court composed of eight permanent members: the states endowed with the most robust navies. Therefore, two aspects are pervasive in such a context of regulating the production of weapons: (a) these negotiations aggregated technical topics about technological development and scientific policies, and (b) Global South/Third World countries contested the privileged position of great powers for providing solutions to universal problems¹³⁶ and deciding rules according to their understandings.

These elements became more evident during sophisticated initiatives that surged since the League of Nations and arguable interests to reduce investments in armaments and set interchange channels of information about war-like industries and arms markets. Yet, these

¹³² See Address by Foreign Minister Gromyko to the General Assembly {Extract} (21st September, 1962); Report by the Senate Foreign Relations Committee on the Test-Ban Treaty (3rd September, 1963); Statement by the Cuban Representative (Lechuga) to the First Committee of the General Assembly: Denuclearization of Latin America, (18th November, 1963).

¹³³ See telegram n°79 (15th August, 1907) from Rio Branco to Rui Barbosa. Available in Portuguese at (Coutinho e Fundação Alexandre de Gusmão 2014).

¹³⁴ See telegram n°55 (5th August, 1907) from Rio Branco to Rui Barbosa. Available in Portuguese at (Coutinho e Fundação Alexandre de Gusmão 2014).

¹³⁵ See telegram n°129 (10th October, 1907) from Rui Barbosa to the Ministry of Foreign Relations of Brazil. Available in French at (Coutinho e Fundação Alexandre de Gusmão 2014).

¹³⁶ Some historians would claim such a complaint was also observed when Charlemagne embargoed the exportation of swords and armors to other people. Indeed, this measure served to refrain the access of these assets to rivals such as Vikings and Slavs (Broner 2017).

diplomatic negotiations (e.g., Kellogg-Briand pact, Washington Naval Treaty of 1922 or the Treaty of Versailles 1919) failed to provide robust and effective mechanisms to curb national aggressive aspirations due to the lack of enforcement¹³⁷ strategies and a sense of unfairness among states (see Brezina 2005; Carr 2016). Keynes and Morgenthau, for instance, rejected the idea these agreements would produce expected outcomes because of their punishing content against specific countries (Keynes 2017; Morgenthau 2003).

Thus, initial initiatives to regulate the nuclear field showed some historical elements that could reinforce the hypothesis that great powers played a crucial role in defining the underpins of this international regime. It comprises ideas to draw rules and institutions to advance in the nuclear disarmament and restrict the access to sensitive materials and technologies. For example, the US, United Kingdom and Canada signed the Quebec Agreement in 1943. These countries accepted not to inform the development of their nuclear project due to risks of proliferation during the WWII¹³⁸. They were the most developed states in nuclear issues.

Because of the destructive power enabled by nuclear bombs, UN agencies have encouraged, since the first UNGA in 1946, multilateral procedures to deal with problems raised by the discovery of atomic energy¹³⁹. For example, the UNSC promptly set up, in 1947, the short-lived UN Commission on Conventional Armaments to draw rules over production of weapons¹⁴⁰. Establishing rules that endorsed the usage of these technologies for peaceful purposes and, meanwhile, refrain the production of weapons was the critical topic in this context¹⁴¹. It is noticeable great powers' participations were crucial to this topic. Since WWII, the great powers from the Allied coalition (i.e., the United States, the United Kingdom, and the Soviet Union) assumed key roles to draw international arrangements and define guiding principles of global governance. During the Yalta Conference, these three countries cemented the idea of "Big Five"; that is, five countries (the US, the United Kingdom, China, the Soviet Union, and France)

¹³⁷ Some diplomats raised this argument during negotiations of the nonproliferation regime, see: Report and Resolution on the Soviet Proposal by the Working Committee of the United Nations Atomic Energy Commission (5th April 1948).

¹³⁸ See United States. Quebec Agreement, (19th August 1943). [Quebec Agreement | The Manhattan Project | Historical Documents \(atomicarchive.com\)](https://www.atomicarchive.com/QuebecAgreement/).

¹³⁹ See UNGA A/RES/1(I).

¹⁴⁰ See S/RES/18 (1947) adopted by 10 votes to none with 1 abstention from the Soviet Union.

¹⁴¹ For this, there are many documents attesting this issue during negotiations of nonproliferation treaties in the UN since the very beginning. See: US Senate Resolution 71: Reduction in Armaments with a view to Improving World Living Standards (28th July, 1955); Joint Declaration by the Heads of Government of the United States, the United Kingdom, and Canada (15th November, 1945); Address by the Soviet Representative (Gromyko) to the UNAEC (19th June, 1946); United States Memoranda on the Proposed Atomic Development Authority, Submitted to Subcommittee I of the UNAEC (2nd July, 1946). In this sense, it was championed the official main goal of the nonproliferation regime according to the following UNGA resolutions: A/RES/1(I) and A/RES/191(III).

who enjoy veto power in the decisions of the UNSC aimed to take actions to preserve peace and avoid acts of aggression. Washington's attempt to include Brazil in this select group faced opposition from Moscow and was rejected. On security-led debates, the UN Atomic Energy Commission was discontinued, in 1949, because the Soviet Union refused to negotiate with members of Taiwan representing China after the Communist Revolution of 1949. Hence, international initiatives to build a world order were orchestrated by these countries.

Hence, other countries and international mechanisms granted great powers leading positions to organize global governance aspects such as nuclear field. These great powers became the first nuclearized countries. Their influence over this issue increased. The most important initiatives to establish international atomic controls and encourage disarmament revolved around their interests. Yet, it does not mean a complete interest convergence among great powers such as the US and the Soviet Union. Since the beginning, Washington and Moscow sustained two opposed perspectives to attain these goals. Whereas the former proposed the establishment of specialized agencies to supervise nuclear policies, the latter believed these objectives would be achieved via a treaty of complete disarmament without any participation of international mechanisms that could serve to espionage.

Other countries introduced relevant proposals in this context (e.g., Ireland, Poland, and Sweden), but these discussions gained momentum because of the understandings of great powers. For instance, the initial idea for the NPT was diplomatically introduced by Ireland in 1958 – the so-called “Irish Resolution”. This resolution envisaged a progressive limitation of the existing stocks of nuclear arms¹⁴² and recognized their danger to world peace. This second topic (A/C.1/L.206) was approved in the UNGA by 37 votes (including the Soviet Union) and 14 abstentions (e.g., the United States, the United Kingdom, and France).

Nevertheless, this prominence of other countries was conditioned to the aspirations of great powers. Ireland's proposals set a path to further discussions between Moscow and Washington. For example, an important debate about the Irish draft was triggered by the Soviet Union¹⁴³ that became unsatisfied with the lack of restrictions to transference of atomic assets between allies (UN 1970). Sweden and Poland, for example, believed nuclear proliferation was a regional issue and, thereby, international bodies had to encourage the set up nuclear-weapons-free zone that banned the deployment of arms and conducting of tests in a given area. Although the Soviet

¹⁴² Irish Draft Resolution Introduced in the First Committee of the General Assembly: Further Dissemination of Nuclear Weapons, October 17, 1958.

¹⁴³ Soviet Memorandum on Measures in the Field of Disarmament, (18th September, 1958).

Union endorsed, in 1957, the Polish plan to establish a nuclear-free zone in Central Europe, these ideas, on a global level, did not gain momentum because the United States rejected them. It claimed these countries worked without consulting others (Maddock 2010) and would favor Moscow because surveillance mechanisms were not mandatory.

In light of this, great powers assumed crucial roles during the negotiation held by the UN. As described in Annex 1, UNSC permanent members held sway over specific organisms to discuss atomic energy and disarmament. For instance, the first two committees to debate nonproliferation issues were the UNAEC and the Commission for Conventional Armaments. In both cases, these countries were the only permanent members. Canada was part of the UNAEC because it had traditional ties with the United States nuclear program. Even in ad hoc committees (e.g., Ad Hoc Committee to Study the Peaceful Uses of the Seabed and Ocean Floor beyond the Limits of National Jurisdiction or the 1967 Secretary-General's Group of Consultant Experts) great powers were influent agents. The only mechanisms that these states were not crucial actors was in the 1968 NNC¹⁴⁴ which was not the most relevant forum to produce effective outcomes and hinged exclusively on NNWS.

When UNGA recommended increasing the number of members from a commission, mechanisms assumed a less prominent role. It happened with the Disarmament Commission in which the UNGA required, in 1958, to enlarge it to include all members of the UN in an organization that previously revolved around its subcommittee composed of the five great powers and Canada. This arrangement held only two sessions from 1958 to 1965. Even the IAEA was originally planned by the United States who hosted meetings¹⁴⁵, from 1955 to 1956, for drafting its statute and encourage other states to adhere to this institution (Patti 2012).

Likewise, robust negotiations were established by the diplomacy of great powers. In 1958, the US, the United Kingdom, and the Soviet Union decided to open new channels of discussion via conferences held in Geneva. These states set conversations in Geneva to discontinue nuclear weapons test. After the end of the Korean War (1950-1953) and death of Stalin (1953), Khrushchev attempted to establish a pragmatic foreign policy towards Western powers via diplomatic negotiations to solve security-related agendas in Europe and atomic issues.

¹⁴⁴ A/RES/2153(B) (XXI).

¹⁴⁵ Statement by the United States Representative (Lodge) to the Disarmament Commission (3rd July, 1956).

Although these two antagonist geopolitical blocs engaged in a geopolitical crisis due to situation of Berlin (1958), Eisenhower¹⁴⁶ and Khrushchev accepted to conduct some negotiations to find common understandings about security-related issues – for example, nuclear proliferation (Gaddis 2006; Smith-Norris 2003). Therefore, this initiative received endorsement from other great powers (e.g., France) who joined these talks in Geneva. In a communiqué released in 1959, these four powers announced that, since great powers were legitimized as the main agents to conduct disarmament, they established a private negotiation aimed to work in tandem with UN efforts. According to the original document:

The four governments conceive of this committee as a useful means of exploring through mutual consultations avenues of possible progress toward such agreements and recommendations on the limitation and reduction of all types of armaments and armed forces under effective international control as may, in the first instance, be of particular relevance to the countries participating in these deliberations. Furthermore, it is the hope of the four governments that the results achieved in these deliberations will provide a useful basis for the consideration of disarmament in the United Nations¹⁴⁷.

Other states were invited according to their interests. For example, Moscow called Czechoslovakia, Poland, and Romania to help in the goal of drawing an agreement to suspend nuclear weapons tests. Western powers similarly invited Italy and Canada to compose the TNCD. These Geneva negotiations, for example, discussed the bases for the PTBT and on-sit inspections of explosion that triggered seismic events above a given level. The UN, in this sense, decided to aggregate these negotiations based upon a great power initiative. The Secretary-General of the UN acquiesced to the idea that these great powers-led initiatives in Geneva would become the core of nonproliferation debates. Hence, it appointed, in 1960, experts and required regular reports about the progress of these negotiations.

The NPT, in light of this, was only possible when great powers accepted either to negotiate an agreement or not to hamper this process (e.g., China and France). Beijing, for example, stated it would respect nonproliferation ideals, although it called this treaty a byproduct of imperialism and asked its partners (Albania, Cuba, Tanzania, and Zambia) to vote against the NPT in the UNGA. In the employed words by the Chinese Communist Statement on Security Assurances of Non-Nuclear-Weapons Nations in 1968:

Using the shameless trick of a thief carrying out “Stop thief!”, the U.S. imperialists and the Soviet revisionists in this agreement try to present U.S. imperialism, which has consistently blackmailed and threatened the people of the world with its nuclear weapons, as the “guardian” of world peace. And they

¹⁴⁶ To check the list of head of states, see Annex 2.

¹⁴⁷ Four-Power Communiqué on Disarmament Negotiations, (7th September, 1959).

vilify socialist China, which has developed nuclear weapons in order to defend itself and world peace, as the source of “nuclear threats”¹⁴⁸.

Yet, both China and France enjoy a privileged place in the NPT proposal of global division. Thus, they did not challenge its existence when received their status of NWSs. When great powers decided that an action could go against their ambitions, these countries hampered the progress of these discussions. For instance, Washington¹⁴⁹ and Moscow negotiated a voluntary moratorium of nuclear tests to enable the draw of a treaty forbidden these actions. It lasted from 1959 to 1961. However, France did not follow this idea and conducted tests in 1960 – which provoked wobble protests from countries in the UNGA¹⁵⁰ (e.g., Ireland, Mexico, Japan, Ghana, Morocco). In addition, Moscow did not accept any international interference over national policies for disarmament. The United States, during ENCD negotiation in 1961¹⁵¹ about disarmament, proposed a UN peace force that would have access to nuclear weapons from great powers to enforce the process of denuclearization. Moscow fiercely protested against it¹⁵². Such an idea was not concluded. Soviet Union knew that the United States was influential inside the UN and could use this against Soviet interests – as the episode of “United for Peace” when UNGA overcame Moscow’s strategy in the UNSC to postpone decisions about the Korean War (1950-1953).

Likewise, this moratorium perished since the Soviet Union discovered the United States’ espionage plans with the airplane U-2 incident¹⁵³ in 1960. Moscow became unsatisfied with the usage of areas in Norway, Pakistan, and Turkey by Western powers to investigate its S&T policies. Debates and some efforts employed in Geneva were suspended. Although twenty-six countries submitted a resolution¹⁵⁴, in 1960, to great powers refrain from undertaking nuclear tests, it was not enough to make these countries stop their explosion. In 1961, Ethiopia, Ghana, India, Nepal, the United Arab Republic, and Yugoslavia reinforced this claim to make great powers forestall their interests in further test explosions. France, the Soviet Union, the United Kingdom, and the US were against because they were not able to reach a robust

¹⁴⁸ Chinese Communist Statement on Security Assurances to Non-Nuclear-Weapon Nations, (13th March, 1968).

¹⁴⁹ Statement by the United States Representative (Lodge) to the First Committee of the General Assembly (29th October, 1958); Statement by the United States Representative (Lodge) to the First Committee of the General Assembly: Suspension of Nuclear Tests, (19th November, 1959).

¹⁵⁰ A/C.I/L.253/Rev.1/Add.1-3.

¹⁵¹ United States Draft Statement of Principles Submitted During the Bilateral Talks with the Soviet Union, (6th September, 1961).

¹⁵² Situation Report on the First Session of the Conference (March to June 1962) – Sec/confidential. 14th June, 1962.

¹⁵³ Statement by the Soviet Representative (Zorin) to the Eighteen Nation Disarmament Committee: Replies to Swedish Questions, (14th May, 1962).

¹⁵⁴ A/RES/1577 (XV).

agreement over this topic (UN 1970). A similar episode happened in 1962. Twenty-nine Afro-Asian countries and three Latin Americans sponsored an UNGA resolution¹⁵⁵ to prohibit explosive nuclear tests and establish a system of verification of seismic events by an international scientific commission. Western great powers and the Soviet bloc abstained to vote.

Such a skirmish became worse after the Berlin wall construction in 1961 and because of the United States aspiration to set the MLF to share nuclear technologies and ballistic missiles among members of NATO – although this weaponry was conditioned to the White House’s approval¹⁵⁶. In this sense, the MLF was a plan hatched in NATO by United States’ administrations of Eisenhower, Kennedy, and Johnson who envisaged a defensive strategy to European countries. The Soviet Union declared it faced considerable problems with NATO and, thereby, Moscow had to take some measures to strengthen security mechanisms. It did not demonstrate interest in continuing Geneva negotiations in 1961. Therefore, Moscow hampered any nonproliferation discussions. Likewise, France did not approve the MLF due to the possibilities of enhancing the German nuclear program and claimed it was an interference from the United States in European affairs. Hence, the United States president in 1965, Lyndon Johnson, decided to abandon the idea of implementing the MLF. Such an action left NATO members unsatisfied¹⁵⁷ (e.g., Italy) who were keen on accessing defensive assets to avoid communist incursions into its region. On the other hand, other countries (e.g., Ghana and Finland) approved this decision because they considered MLF a threat to global peace¹⁵⁸.

Indeed, great powers pushed the NPT forward during the 1960s. Previously, despite international claims, these countries established different nuclear policies – for example, providing endorsement to allies. Moscow, during 1950s, helped China and Czechoslovakia to master atomic technologies by sending experts and materials (Coe and Vaynman 2015) and set a diplomatic initiative to promote the peaceful use of nuclear energy. The United States did the same with the “Atoms for Peace” project. This program encouraged other countries to rely on Washington as a supplier of equipment to build needed facilities for peaceful-led nuclear policies or to conduct related researches.

¹⁵⁵ A/RES/1762A (XVII).

¹⁵⁶ Address by the Special Adviser to the Secretary of State (Smith) at the Naval Academy Foreign Affairs Conference: Proposed Multilateral Force, (2nd April 1964).

¹⁵⁷ Address by ACDA Director Foster Before the Commonwealth Club at San Francisco, (4th June, 1965).

¹⁵⁸ Statement by the Soviet Representative (Fedorenko) to the Disarmament Commission, April 26, 1965.

Since countries were keen on acquiring reactors to show a sort of scientific prestige, found many partners in the Global South¹⁵⁹. It also served to increase the market share of companies from the United States in this area (Lima 1986) and consolidate the role of Washington as a leadership to conduct nuclear policies (Colgan and Miller 2019). The Atoms for Peace offered an opportunity sell reactors and nuclear-related machines from the United States – it promoted “turn-key agreements” in which the contractor receives everything ready to use and the supplier also provide the fuel. Since 1951, the United States government licensed companies to produce, in large-scale, reactors. As depicted in Table 5, the United States established diplomatic nuclear ties with thirty countries during 1950s and mid-1960s (before the NPT):

Table 5 – The United States’ agreements for nuclear cooperation during the 1950s and 1960s.

Country	Effective date
Argentina	1962
Australia	1957
Austria	1960
Brazil	1966
Canada	1955
Colombia	1963
Denmark	1955
Greece	1955
India	1963
Indonesia	1960
Iran	1959
Ireland	1958
Israel	1955
Italy	1958
Japan	1968
Norway	1967
Philippines	1968
Portugal	1955
South Africa	1957
South Korea	1956

¹⁵⁹ Wohlstetter, Alberi. 1976. ‘Spreading the Bomb without quite Breaking the Rules’. In: FGV-CPDOC, Arquivo Paulo Nogueira Batista.

Spain	1958
Sweden	1966
Switzerland	1956
Taiwan	1955
Thailand	1966
Turkey	1955
United Kingdom	1955
Venezuela	1960
Vietnam	1959

Source: own elaboration¹⁶⁰

However, this scenery changed. Beijing engaged in a geopolitical struggle with Moscow since the Soviet Union did not allow Chinese to produce nuclear weapons and both countries disputed influence over the Communist bloc. Likewise, Western powers also faced problems because France conducted nuclear tests in an attempt to preserve its prestige (Wrobel 1992). After the Cuban Missile Crisis in 1962 that exposed the world to the brink of a nuclear war, these states¹⁶¹ assumed more assertive efforts to conclude a restrictive treaty, although its content reinforced the idea of a nuclear cartel composed of few members. For example, these countries improved communication channels (e.g., Hot Line Agreement), in 1963, to reduce the risks of a nuclear war¹⁶².

During this period, Castro's enthusiasm¹⁶³ after Moscow's decision to ship nuclear weapons in Cuba to respond to Washington's similar efforts in Turkey served as an excuse to encourage great powers to restrict the access of atomic assets. In so being, the Soviet Union endorsed Havana¹⁶⁴'s decision refused to adhere to the Treaty of Tlatelolco, in 1967, because the United States did not dismantle the Guantanamo Bay naval bases and avoid the inclusion of Porto Rico in this agreement¹⁶⁵. It is worthwhile to mention that China criticized the shipment of rockets to Cuba as a Soviet reckless strategy that exposed an external country to risks triggered by geopolitical issues¹⁶⁶. Likewise, the possibility of West Germany to have access to

¹⁶⁰ Data from: Letter From Assistant Secretary of State Macomber to Senator Cooper on the Nonproliferation Treaty, (5th September, 1968).

¹⁶¹ Interview of Premier Khrushchev with the Editor of 11 Giorno {Extract}, (20th April, 1963); Statement by Secretary of State Rusk to the Senate Foreign Relations Committee: Test-Ban Treaty, (12th August, 1963).

¹⁶² ACDA Statement on Direct Communications Link Between Moscow and Washington, (5th April, 1963).

¹⁶³ Fidel Castro's Letter (26th October, 1962) – document translated to English found in the Kennedy's library.

¹⁶⁴ Statement by the Cuban Representative (Alarcon de Quesada) to the First Committee of the General Assembly: Latin American Nuclear-Free Zone, (26th October, 1967).

¹⁶⁵ Statement by the Soviet Representative (Mendelevich) to the First Committee of the General Assembly: Latin American Denuclearization Treaty (27th October, 1967).

¹⁶⁶ Chinese Communist Statement on the Soviet Union and the Test-Ban Treaty {Extracts}, (1st September, 1963).

nuclear weapons led the Soviet Union to a more conciliatory position towards restrictions over atomic proliferation¹⁶⁷.

In this sense, the United States' president John Kennedy¹⁶⁸ claimed, in 1962, that it was necessary a global effort to curb nuclear proliferation because he supposed that, during the following years, fifteen to twenty-five countries would be ready to produce weapons. This context, motivated not only the elaboration of regional treaties against nuclear proliferation¹⁶⁹, but also encouraged great powers to move forward in a global proposal. The UNGA released some resolutions to make countries consider stopping atomic tests and promote denuclearization¹⁷⁰.

The ENCD was the major effort to negotiate the NPT. In 1962, the UN Secretary-General inquired the sixty-two members about what they considered necessary conditions to make them refrain from using nuclear energy for military-led purposes¹⁷¹. Countries usually asked for reciprocity among states and the implementation of measures to control the ambitions of great powers (UN 1970). It served to facilitate the work of members from the ENCD. However, not much progress was made during 1963 and 1964. Great powers did not reach agreements due to their different perspectives about nuclear proliferation. In addition, the ENCD focused on the attempt to draw treaties aimed to ban nuclear tests or reduce military expenditures (Swango 2014). The UNSC, in 1963 and 1964, discussed other subjects such as apartheid in South Africa, issues related to Cyprus, and topics about Cambodia.

From 1965 to 1968, it attempted to conclude a comprehensive text to deal with this issue. Yet, this process was more a coordination between great powers than a multilateral negotiation. For instance, the ENCD had a subcommittee composed of the United Kingdom, the United States, and the Soviet Unions – Moscow and Washington were also permanent Co-Chairs of ENCD sessions. France abstained to join these talks, China was a matter of concern about who would represent this country (Taipei or Beijing), and Moscow did not hamper negotiations to include a country that was competing for influence and performed nuclear tests by Zedong's aspirations. Endorsements to the participation of China came mainly from states like Pakistan and Albania who claimed Beijing had to legitimize these negotiations. Likewise,

¹⁶⁷ Interview by Foreign Minister Gromyko with Izvestiya Correspondent, (March 2nd, 1964).

¹⁶⁸ News Conference 52, President John F. Kennedy (21st March, 1963) – John F. Kennedy Library Digital Archive.

¹⁶⁹ The Foreign Minister of Mexico, Alfonso García Robles, received a Nobel Peace Prize in 1982 due to his personal efforts to encourage Latin Americans to engage in a nonproliferation treaty.

¹⁷⁰ See A/RES/2032(XX), A/RES/2033(XX); A/RES/2163(XXI).

¹⁷¹ Official Records of the Disarmament Commission, Supplement for January 1961 to December 1962, document DC/201 and Add. 1-3.

West Germany stated that China had to join these negotiations to abide by the rules – a suggestion that Beijing refused (Popp 2014).

Also, great powers were crucial agents to the NPT because UN mechanisms were subordinated to the UNSC. Although other states claimed more members should have had the opportunity to raise their opinions over nuclear issues, great powers held sway over decisive actions. The UNGA was left to other states, but opinions and resolutions produced in this arena are not mandatory. The Conference of Non-Nuclear Countries, postponed in 1966 by the UNGA to 1968, occurred because these states claimed they did not have the necessary opportunity to study the content of the NPT. In so being, they stated that this agreement was voted without completely understand of UN members (Burns 1969). Hence, NPT's final content was prepared according to great powers' understandings (Swango 2014). They had to consent to introduce new amendments and text revisions from other countries.

The NPT text was only concluded because great powers agreed on its content. Washington and Moscow propelled robust discussions by solving the aforementioned geopolitical issues. These two great powers initiated private talks in Geneva via their diplomacy in the mid-1960s. This context enabled them to elaborate a nonproliferation plan when many countries made scientific progress to have nuclear programs based upon indigenous efforts. Both sides understood the NPT could also work to prevent the nuclear proliferation in the allies of their rivals (Popp 2014). Likewise, there was an international pressure to make great powers overcome gridlocks and design this treaty¹⁷². Indeed, it also reinforced the social legitimation of the special role of these countries to conduct such negotiations.

In this sense, I concluded great powers played a decisive in the draw nuclear nonproliferation bulwarks (e.g., the NPT). This sentence represents an incisive textual confirmation that great powers teamed up to draw a global nonproliferation regime – in the words of the United States House Foreign Affairs Committee in 1968, it was “like Eliot Ness joining up with the Capone mob to police Chicago”. According to the Report by the Senate Foreign Relations Committee on the Treaty on the Nonproliferation of Nuclear Weapons:

Essentially, the treaty formalizes the mutual concern of the United States, Great Britain, and the Soviet Union in containing the spread of nuclear weapons. The United States, Great Britain, and the Soviet Union appear to have a sober understanding of the increased dangers of nuclear war that would come as more and more nations possess nuclear weapons¹⁷³.

¹⁷² A/RES/2028 (XX).

¹⁷³ US. *Report by the Senate Foreign Relations Committee on Amendment to Arms Control and Disarmament Act*. In: Documents on Disarmament 1968. (1968).

Although it is not possible to confirm explicit collusion among great powers to curb the emergence of some NNWSs to the same status, I confirm that countries shared the awareness that the NPT reinforced the world's hierarchical structure by establishing restrictions to the technological development of other states according to their standpoints. In this sense, great powers did not imposed the nonproliferation regime by force. There were multilateral negotiation in the UN, but the next section (5.3.) investigate if these aspects worked to legitimize the established rules globally. As the Swedish diplomacy stated in 1965:

Parentetically I may observe that these five nuclear countries are obviously now accepted not only as *faits accomplis* but as belonging in a special category. This could only be based on their being precisely those States which have the right to occupy the permanent seats in the Security Council and which thus, as “great Powers”, carry a special responsibility for the maintenance of peace, and are for that reason expected to act in harmony between themselves. Otherwise there could be no specific circumstance justifying a categorical cleavage between these five and all others¹⁷⁴.

5.3. Legitimation phase: convincing other countries to abide by nonproliferation rules.

I observed that NWSs employed social and diplomatic mechanisms of persuasion to set up this architecture and enlarge international understandings– otherwise, it could trigger a general disinclination by states not to adhere to a regime that affects their interests and/or prestige. In an US official document, it was exposed such an understanding of engaging in a social legitimation campaign – instead of enforcing the regime by means of force:

[...] Our power to influence the decisions of sovereign nations has its limits. We cannot, even if we would like to, dictate to them what their policy should be. Our influence is limited to our power to persuade; and our ability to persuade is dependent upon the good will, the confidence and trust we enjoy with the leaders, governments, and people of these countries¹⁷⁵.

During this section, I report findings that reinforce the confidence in the hypothesis of the Middle Power Trap. Documents demonstrated NWSs attempted to lure other countries into believing nonproliferation instruments – mainly the NPT – represented a robust step towards global peace. In other words, great powers attempted to convey the conclusion of nonproliferation cornerstones “would open up more favorable possibilities for achieving agreement on other disarmament questions and in the first place on questions of nuclear

¹⁷⁴ Sweden. ‘Statement by the Swedish Representative (Myrdal) to the Eighteen Nation Disarmament Committee’. (ENDC/PV.222). In: Documents on Disarmament 1965. (1965).

¹⁷⁵ US. ‘Address by Under Secretary of State Katzenbach to the Institute of International Relations: U.S. Arms for the Developing World’. In: Documents on Disarmament 1967. (1967).

disarmament”¹⁷⁶. Such initiative aimed to demonstrate that the NPT would rather increase international security and provide benefits to the entire world:

At the resumed twenty-second session of the General Assembly, there was a detailed debate on the relative merits and shortcomings of the joint draft treaty. The USSR, the United States and the United Kingdom led the supporters of the treaty in stressing that it would increase the security of both nuclear and non-nuclear-weapon States, would enable all nations, particularly the developing nations, to share in the benefits of peaceful applications of nuclear energy, and would facilitate the cessation of the nuclear arm’s race¹⁷⁷.

In this sense, NWSs attempted to: (a) demonstrate these mechanisms were defined via multilateral consensus; (b) claim instruments, like NPT, provided common goods for the world order; and (c) reinforce their arguable commitment to dismantle their nuclear arsenals. On legitimation, NWSs were aware that many NNWSs would only join this agreement if it provided benefits in exchange for adhering. There was a sort of bargain controlled by great powers to ensure that other states could adhere to the cornerstone of the nonproliferation regime. Since the beginning of negotiations, some countries (e.g., Burma) complained that the NPT would preserve the aspirations of great powers and control the nuclear programs of other states (UN 1970). To sum up, I unveil findings extracted from the NPT negotiations. It emphasized an attempt to build a social legitimation of the fundamental interests that underpinned the treaty’s text.

The United Arab Republic, Nigeria, Ethiopia, and Brazil claimed this treaty would be effective only by taking into consideration the social and economic development of all countries. There were also suspicions if great powers could reach an agreement to curb nuclear weapons testing¹⁷⁸. In this sense, the eight non-aligned members of the ENCD drafted a memorandum criticizing the lack of efforts from great powers to halt the nuclear arms race and eliminate their stocks¹⁷⁹ (UN 1970). India similarly raised some grievances that NPT had to address more assertively the denuclearization of great powers and preserve the right of using nuclear materials for production of energy:

A non-proliferation treaty, therefore, if it is to effective, viable and generally acceptable, should prevent both nuclear-weapon and non-nuclear-weapon Powers from proliferating. It should contain an acceptable

¹⁷⁶ USSR. ‘Statement by the Soviet Representative (Roshchin) to the Eighteen Nation Disarmament Committee’ (ENDC/PV.313). In: Documents on Disarmament 1967. (1967).

¹⁷⁷ UN, *The United Nations and Disarmament 1945-1970*. (New York: United Nations Publications, 1970), 239.

¹⁷⁸ Eight Nation Joint Memorandum on a Comprehensive Test-Ban Treaty, (26th August, 1968).

¹⁷⁹ Official Records of the Disarmament Commission, Supplement for January to December 1965, document DC/227, annex 1, section E (ENCD/158).

balance of obligations and responsibilities. It should be a real and meaningful step towards disarmament. It should not in any way hamper the utilization of nuclear energy for peaceful purposes¹⁸⁰.

In another document from 1967, Indian diplomacy added that it could accept an equitable agreement that assure the search for the common good of states and not the consolidation of an international hierarchy. In this sense, such a treaty had to address the following issue:

Unfortunately, no real or effective effort is being made to deny prestige to possession of nuclear weapons. On the contrary, reports indicate that the nuclear-weapon Powers are being given an overwhelmingly privileged position in the propositions which are being elaborated these days. As time goes on, the nuclear-weapon Powers are apparently contemplating ever-increasing provisions of discrimination. The unbalanced aspects of the earlier draft treaties are being embellished further, and attempts are being made to construct the most perfect structure of imperfection. The nuclear-weapon Powers now want comprehensive controls over the peaceful activities of civil nuclear Powers, without, of course, any control whatsoever over their own activities, peaceful or warlike. They even want to prohibit the civil nuclear Powers from undertaking peaceful explosions purely for their economic development even if such peaceful pursuits take place under international supervision¹⁸¹.

When the United States and the Soviet Union submitted identical drafts of NPT to the ENCD in August 1967¹⁸², they negotiated the treaty's content to other members (UN 1970). Yet, they also tried to maintain topics that enabled their agreement over nonproliferation issues regardless opposite interests from other states. Hence, these countries engaged in activities to approach other countries by reducing their reticence – for example, the draft of a UNSC resolution (SC/RES/255) aimed to assure countries that the United States, the Soviet Union, and the United Kingdom were prone to respect the NPT and condemned any use of nuclear assets for aggressive purposes. Inside the UNSC, it was approved by other countries like Canada, Denmark, Paraguay, Senegal, China, and Ethiopia (UN 1970). This step also calmed the anxious of great powers' historical allies that fear the usage of nuclear weapons against them – e.g., Australia¹⁸³. Such initiative was to demonstrate that the NPT would increase international security and provide benefits to the entire world:

At the resumed twenty-second session of the General Assembly, there was a detailed debate on the relative merits and shortcomings of the joint draft treaty. The USSR, the United States and the United Kingdom led the supporters of the treaty in stressing that it would increase the security of both nuclear and non-nuclear-weapon States, would enable all nations, particularly the developing nations, to share in the benefits of peaceful applications of nuclear energy, and would facilitate the cessation of the nuclear arm

¹⁸⁰ Statement by the Indian Representative (Husain) to the First Committee of the General Assembly: Nonproliferation of Nuclear Weapons, (14th May, 1968).

¹⁸¹ Statement by the Indian Representative (Trivedi) to the Eighteen Nation Disarmament Committee: Nonproliferation of Nuclear Weapons, May 23, 1967.

¹⁸² Official Records of the Disarmament Commission, Supplement for 1967 and 1968, document DC/230 and Add.I, annex IV, ENCD/192 and ENCD/193.

¹⁸³ Statement by the Australian Representative (Shaw) to the First Committee of the General Assembly: Nonproliferation of Nuclear Weapons, (17th May, 1968).

s race. The benefits that would be derived by the non-nuclear-weapon States would outweigh, they said, whatever disadvantage could result from their forswearing nuclear weapons (UN 1970, 293).

Complementing this affirmation:

Accordingly the United States, the Soviet Union and the United Kingdom have agreed to sponsor a draft resolution on security assurances for consideration by the United Nations Security Council, the organ of the United Nations bearing the primarily responsibility for the maintenance of international peace and security. We would propose that the text of the draft resolution appear in an annex to our draft report to the General Assembly, on which report we expect to consult the Committee shortly. The text of the draft resolution is before you, in document ENCD/222.21 do not, therefore, propose to read it. This Security Council resolution will lay a firm political, moral and legal basis for assuring the security of non-nuclear countries¹⁸⁴

NWSs argued that their understanding of the NPT hinged on peaceful-minded interests. In the preamble of the NPT (see Annex 3), it became crystal clear the arguable aspirations to control nuclear proliferation to set a more cooperative and secure context. The NPT would provide the basis for a cessation of the nuclear arms race and strengthen trust among states to enable the use of atomic energy for peaceful-led interests. It also emphasized that the use of force was a threat to international relations and, thereby, this agreement would ensure the maintenance of peace. In so being, states that did not agree with these terms were against this diplomatic effort to preserve human life. Although NPT's Article X allowed countries to withdraw from the treaty since it was a sovereign right, the spread of this awareness that this effort was a global endeavor to promote peace constrained this option socially. Other countries would discourage such action by claiming it was incompatible with global aspirations for peace. As Walker (2011) said, the status of non-membership of the NPT was considered *de facto* an infringement of the rules by other states.

Mexico, likewise, tried to obligate great powers to transfer the technical knowledge necessary for the production of nuclear energy. Since the United States established previous programs of atomic assistance to allies and partners (e.g., Atoms for Peace), Mexico attempted to persuade other countries into endorsing this proposal. Nigeria¹⁸⁵, for instance, offered a more comprehensive amendment claiming all states have to cooperate by providing even material resources for the ones who needed them to set up their nuclear projects. Because these issues did not converge with the United States interests, they were rejected. Great powers accepted only to include in NPT's Article IV (see Annex 3) that the development of a peaceful-led nuclear program was an inalienable right and this treaty sought to facilitate cooperation in this area (Swango 2014). In fact, such a concession came to respond some criticism from countries

¹⁸⁴ Statement by ACDA Director Foster to the Eighteen Nation Disarmament Committee: Tripartite Security Assurances Proposal (7th March, 1968).

¹⁸⁵ Statement by Ambassador Goldberg to the First Committee of the General Assembly: Nonproliferation of Nuclear Weapons, (31st May, 1968).

like Italy, Belgium, and Sweden who asked for an emphasis on facilitating the access to equipment for nuclear power plants (UN 1970). As emphasized by the United States' diplomacy:

Also in article IV the character of this sharing has been broadened by specifically including "equipment" and "materials" in addition to scientific and technological information. This change corresponds to a view strongly voiced by the representative of Italy and shared also by Belgium and other delegations¹⁸⁶.

In this context, some countries claimed Article IV legitimized discriminations among states. It did provide legal instruments that enforced great powers to grant assistance to other states. Such an article sustained a feeble encouragement to cooperative ties among countries, but it was unclear how these processes could happen. It was considered just a promise that great powers would help others to enjoy the benefits from nuclear power. Bulgaria stressed the value of cooperation in nuclear technology to the development of countries so that great powers had to preserve free flow of international and transfer of knowledge (UN 1970). However, it suffered only minor changes and did not address the whole critics of these countries. Great powers received the endorsement of scientists and other countries (e.g., Japan) that it was impossible to differentiate the purpose of a nuclear explosion. Hence, they were prohibited regardless the interest of many states to conduct them for scientific interests and construction purposes – emulating the United States' idea of the Project Plowshare, that lasted until Carter's administration, to shale oil extraction or widening the Panama Canal¹⁸⁷.¹⁸⁸ The disappointment of some NNWS over this prohibition was depicted by the Indian diplomacy in 1968:

The other disturbing and discriminatory feature of the draft treaty concerns the one-sided prohibitions on non-nuclear-weapon States in respect of the peaceful utilization of nuclear energy. It prevents them from conducting nuclear explosions for peaceful purposes. In this connexion I need hardly recall the serious and protracted discussions on Plowshare in 1958 and 1960, when the need for and possibilities of peaceful nuclear explosions by all was recognized, but the problem of modalities connected with the test-ban treaty made it difficult to come to an agreement¹⁸⁹.

Unlike Canada who considered Article IV a sort of right granted to NNWS, India believed it served to widen the technological gap between states (UN 1970). The Soviet Union set conversations with countries like Brazil to encourage them to accept the content of the NPT by demonstrating that it was aimed to enhance technological cooperation. Moscow reported it was aware about this issue during the negotiations of the NPT:

¹⁸⁶ Statement by Ambassador Goldberg to the First Committee of the General Assembly: Nonproliferation of Nuclear Weapons, (31st May, 1968).

¹⁸⁷ The Soviet Union had a similar program that lasted until 1989.

¹⁸⁸ The Soviet Union had a similar program that lasted until 1989.

¹⁸⁹ Statement by the Indian Representative (Husain) to the First Committee of the General Assembly: Nonproliferation of Nuclear Weapons, (14th May, 1968).

Closely connected with the question of nuclear explosions for peaceful purposes is the problem of the peaceful use of nuclear energy. It is quite natural that the non-nuclear countries, as a result of signing the non-proliferation treaty — that is, as a result of becoming parties to this treaty — should have no desire to create any complications for themselves in the future in regard to utilizing the benefits to be derived from the carrying out of such peaceful nuclear explosions. In the statements made by the representatives of some States, in particular in the statements made by the representative of Brazil in our Committee, Mr. de Araujo Castro, and his predecessor, fears have been expressed that the non-nuclear countries will not be able independently to carry out nuclear explosions for peaceful purposes. Thus at our meeting of 8 February Mr. de Araujo Castro expressed the view that the provisions of articles IV and V of the complete draft treaty on non-proliferation would divide the world into two categories of countries, and that in one category would be those which would be “technologically dependent” on the others in regard to the carrying out of peaceful nuclear explosions¹⁹⁰.

Another quarrel was due to the content of Articles I and II. Although many states agreed with these restrictive topics to stop the transference of technologies to agents interested in exploding devices, countries like Brazil did not understand why the NPT included a restriction over assistance to conduct even peaceful nuclear explosions¹⁹¹. In this sense, these countries did not believe it would allow nuclear cooperation because states were prohibited from assisting others that produce explosive devices for peaceful-led tests. India followed Brazil in these concerns¹⁹². Brazil¹⁹³ also proposed a re-write of Articles I and II to change the words explosive devices for weapons. However, this proposal was rejected. The United Arab Republic¹⁹⁴ similarly failed to amend Article I with new provisions against the access of atomic elements by private agents.

Another problem involved article VI and IX (see Annex 3). Unlike the concessions of great powers to the interests of NNWS to have the right to establish regional nuclear-weapon-free zone¹⁹⁵, Article VI reported that denuclearization was an envisaged procedure to the entire world and would hinge on the good faith of states to follow this principle. In addition, the third paragraph of Article IX stated that official nuclear states were the ones who conducted tests until 1967 – that is, only the five great powers. Other states were not allowed to undertake nuclear explosive tests, and great powers promised to forestall their military-led atomic aspirations at an early date. India complained there was no enforcement mechanism to punish

¹⁹⁰ Statement by the Soviet Representative (Roshchin) to the Eighteen Nation Disarmament Committee: Nonproliferation of Nuclear Weapons, (16th February 1968).

¹⁹¹ Statement by the Brazilian Representative (de Araujo Castro) to the Eighteen Nation Disarmament Committee: Nonproliferation of Nuclear Weapons, (8th February, 1968).

¹⁹² Statement by the Indian Representative (Husain) to the Eighteen Nation Disarmament Committee: Nonproliferation of Nuclear Weapons, (27th February, 1968).

¹⁹³ Brazilian Amendments to the Draft Treaty on Nonproliferation of Nuclear Weapons, (13th February, 1968).

¹⁹⁴ Statement by the U.A.R. Representative (Khallaf) to the Eighteen Nation Disarmament Committee: Nonproliferation of Nuclear Weapons, (20th February, 1968).

¹⁹⁵ Final Document of the Conference of Non-Nuclear-Weapon States, (1st October, 1968).

great powers that did not move towards denuclearization. To sum up, the United Arab Republic claimed:

One of the aspects of the article IX continues to attract our attention. That is the definition of nuclear-weapon States at the end of its paragraph 3. As we stated at the meeting of 26 September 1967, this definition actually leads to a limitation of the five Powers which are at present the only ones known to have manufactured and exploded a nuclear weapon or other nuclear explosive device before 1 January 1967¹⁹⁶.

Brazil, Nigeria and Sweden questioned the number of countries necessary to make this treaty entry into force. According to Article IX, the NPT would enter into force when the great depositaries of the Treaty (i.e., the United States, the Soviet Union, and the United Kingdom) and more forty countries ratified it. Nigeria, for example, claimed it was necessary a larger number of states to accept the validity of the NPT¹⁹⁷. Great powers strived to maintain this number and worked to convince other states to join the NPT after it began to work. They managed to find the necessary number of states (including ENCD members such as Ethiopia, Mexico, and the United Arab Republic) and, in 1970, the NPT entered into force. In a similar thorny issue, some countries complained about how NPT influenced the IAEA to promote safeguard systems. Whereas IAEA aimed to establish more robust and globally valid mechanisms - CSA with non-nuclear-weapon State parties to the NPT based upon, great powers only assumed voluntary agreements to enable the surveillance of IAEA -VOA with the nuclear-weapon State parties to the NPT. Such a divergence over safeguard aspects forced great powers to employ diplomatic efforts to avoid disappointments from other countries:

The system of safeguards has been specifically, designed to avoid hampering a State's economic or technological development. Moreover, the inspectors are under instructions to implement the system in a manner designed to be consistent with prudent management practices required for the economic and safe conduct of nuclear activities. In large power reactors inspectors must, of course, have access at all times to the facilities, the equipment and the materials; but they must not interfere with the economic operation of the facilities. The recent experience of a private utility company in the United States with IAEA inspections has shown that they are not burdensome and that they in no way hamper economic operation of the reactor¹⁹⁸.

However, as Lima (1986, 121) claimed, NNWS countries complained that great powers would accept only VOA that were not considered considerable mechanism to reverse their military-led atomic programs' production and, thereby, promote the nuclear disarmament:

Moreover, the United States and the United Kingdom governments offered to place their peaceful nuclear activities subject to IAEA safeguards. Since nuclear countries were exempted from that obligation, the

¹⁹⁶ Statement by the U.A.R. Representative (Khallaf) to the Eighteen Nation Disarmament Committee: Nonproliferation of Nuclear Weapons, (20th February, 1968).

¹⁹⁷ Statement by ACDA Director Foster to the Eighteen Nation Disarmament Committee: Nonproliferation of Nuclear Weapons, (13th March, 1968).

¹⁹⁸ Statement by ACDA Director Foster to the Eighteen Nation Disarmament Committee: Underground Test Ban and Nondissemination of Nuclear Weapons (7th September, 1965).

offer was intended to mitigate NNWS concern that the safeguard provisions would interfere with the development of their civilian nuclear programs, therefore giving an unfair advantage to the NWS.

It was also necessary to convince great powers' allies. For instance, six countries that made up the Euratom (Belgium, France¹⁹⁹, Italy, Luxemburg, the Netherlands, and West Germany) did not agree with the consolidation of IAEA was the system verification employed in the NPT because they had established their methods and were scared about possible exposition to industrial espionage²⁰⁰. Other states alleged granting IAEA the right to investigate national nuclear policies was conceding parts of sovereignty to accept a blank system of control that was not very elaborated²⁰¹.

However, Moscow pressured the Western powers because it would be unfair that members from NATO could be subject to self-inspection. Japan and Pakistan agreed with the Soviet Union. Thus, they needed to follow the rules. In light of this, the ENCD discussed the content in the NPT over IAEA inspection. Article III of the NPT, therefore, reinforced this sort of inspection would only procedures related to the use of nuclear material in research facilities described by national states. It is worthwhile to mention that, since 1961, the IAEA elaborated safeguard systems to establish mechanism of accountability and bilateral or multilateral arrangements to ensure that fissionable materials would be applied only to peaceful purposes²⁰².

Despite these efforts to remove loopholes, it was necessary for further negotiations between IAEA and Euratom to draw an agreement²⁰³, in 1973, over this issue and, thereby, convince European countries about the effectiveness of the NPT. It is worthwhile to mention that international verification was previously a matter of concern to other states such as India. New Delhi, in 1965, considered these rules unfair because they would not be efficient to check the development of great powers. A exert of Indian representative in the UN about that topic was:

Institution of international controls on peaceful reactors and power stations is like an attempt to maintain law and order in a society by placing all its law-abiding citizens in custody while leaving its law-breaking elements free to roam the streets. I suppose one can say that this is one way of keeping the peace; but

¹⁹⁹ It is worthwhile to mention that France did not enter into controversy about this topic.

²⁰⁰ Statement by the Department of State on Nonproliferation and Peaceful Nuclear Activities, (20th February, 1967).

²⁰¹ See Statement by the United States Representative (De Palma) to the Eighteen Nation Disarmament Committee: Nonproliferation of Nuclear Weapons, (22th February, 1968).

²⁰² Safeguards System of the International Atomic Energy Agency (31st January, 1961).

²⁰³ IAEA/EURATOM AGREEMENT – an explanation by David A.V.Fischer/ Division of External Relations, IAEA. Document found at the IAEA digital library.

surely it is more rational to keep the law-breaking elements under restraint rather than the law-abiding citizens²⁰⁴.

Likewise, the Soviet Union coped with the rebel position from Romania. Ceausescu engaged in a more autonomous policy due to his aspirations to transform Romania into a Communist power. During nonproliferation debates, Romania raised many grievances against the content of NPT, such as:

Fourthly, what is the political, legal and ethical concept underlying the position of the sponsors on control? How does one explain that the draft treaty advocates the application of control solely in relation to the obligations which the non-nuclear States would have to assume under article II, whereas in relation to the obligations to be assumed by the nuclear Powers under article I no measure of control is proposed? Could it be acceptable that almost all the States of the world — generally speaking, the small and medium-sized States— should be subject to control and that only five countries, namely the nuclear Powers, should not be subject to any control measures? How could such a profoundly discriminatory concept be reconciled with the sovereign equality of States, a cardinal principle of contemporary international relations, to which all the States represented on this Committee have subscribed as members of the United Nations?²⁰⁵

However, Moscow was able to convince East European partners to endorse the agreement. Bulgaria, Hungary, East Germany, Poland, and Czechoslovak issued a statement in 1968 to demonstrate their unanimity favorable instance towards the NPT²⁰⁶. It showed a convergence of great powers in favor of the NPT. Great powers from both sides of the Cold War endorsed this treaty and encouraged other states to accept its content. Whereas the government of the United Kingdom considered the NPT a robust instrument to control nuclear weapons, President Nixon claimed it was an important event and the Soviet administration considered this treaty was an important international law that even states that were not parties to the treaty could not ignore (UN 1970, 304).

The NPT became the cornerstone of the nonproliferation regime, but some countries still contested its content. Since great powers did not solve their grievances. But this treaty assumed an important role inside the international relations. As described during this investigation, great powers held sway over these decisions. It became evident since these countries safeguarded their special role in nuclear issues. As the Swedish official in the ENCD claimed in 1966:

If there exist valid arguments for these States to possess nuclear weapons, why do they not apply to any other countries? I think we must be aware that in the political discussions inside our countries, at least in Europe, those who argue for production or acquisition of nuclear weapons, or at any rate for retaining the

²⁰⁴ Statement by the Indian Representative (Trivedi) to the Eighteen Nation Disarmament Committee, (12th August, 1965).

²⁰⁵ Statement by the Romanian Representative (Ecobesco) to the Eighteen Nation Disarmament Committee: Nonproliferation of Nuclear Weapons, (6th February, 1968).

²⁰⁶ East European Statement on the Nonproliferation of Nuclear Weapons, (8th March, 1968).

nuclear option, draw much of their support precisely from the argumentation in the non-major nuclear-weapon countries in our own part of the world²⁰⁷.

It was not a claim that other countries have to manufacture nuclear weapons, but it denounces the existing inequality of power and influence during this negotiation. In this sense, these findings enhance the confidence in the hypothesis that nonproliferation debates and the draw of the NPT were an NWS-led influenced area. It does not mean the nonproliferation regime was imposed by the NWSs using force. Of course, these countries had to concede some room to the demands of other members. However, the participation of other states in the UN mechanisms to produce the NPT, for example, served to legitimize draft texts from great powers who assumed prominent roles inside this structure.

NWSs managed to preserve the core of their aspirations and consequently maintained the hierarchy of global dynamics. Despite negotiations, this context hinged on the ability of great powers to convince other states that NPT and other nonproliferation mechanisms were capable of reducing the nuclear arms race and legitimate attempts to organize international relations to the benefit of everybody. It is a systematic element observed since the very beginning of great powers attempt to promote nonproliferation elements and convince others that they are legitimate leaderships – as noticed in a letter from Eisenhower to Nehru in 1957:

I agree that it is in the power of my country along with those others who possess nuclear weapons to put an end to the fear and horror which the possibility of their use imposes. I want to assure you with all the sincerity of which I am capable that we stand ready, unbound by the past, to continue our efforts to seek a disarmament agreement, including the cessation of nuclear testing, that will promote trust, security and understanding among all people²⁰⁸.

The PTBT, for example, did not cover all nuclear testing because of disagreements between great powers. Likewise, the fear of espionage and technological competitions hampered more comprehensive initiatives. Although great powers promised to listen to the NNWS claims, they assured their prevalence over nuclear technologies while working to legitimate their exceptional role of agents holding a moral responsibility to preserve global peace. In the words of the United Kingdom Prime Minister Wilson in 1970:

Let us remember that, although the Treaty on the Non-Proliferation of Nuclear Weapons comes into force today, there are still a number of States which have not yet adhered to the Treaty. We hope that these ceremonies in the capitals of the three depositary Governments will encourage those States to overcome

²⁰⁷ Statement by the Swedish Representative (Myrdal) to the Eighteen Nation Disarmament Committee: Nonproliferation of Nuclear Weapons, (24th February, 1966).

²⁰⁸ Letter From President Eisenhower to the Indian Prime Minister (Nehru) on Nuclear Test Explosions, (15th December, 1957).

their present hesitations and to recognize that this Treaty offers to them individually and to mankind in general the best hope of avoiding nuclear war²⁰⁹.

Thus, NWSs promised to work for global disarmament, but they preserved their geopolitical ambitions. In other words, there were negotiations between great powers and NNWS. The latter, regardless of their lack of robust influence, obligated the former to include some of their interests and demands. Otherwise, these states would not comply with the rules of this treaty. Yet, great powers preserved their special status and blocked attempts that could facilitate other states to obtain nuclear technologies – for example, prohibition of any sort of nuclear explosions regardless of their initial objectives. It left some states unsatisfied because they arguably endorsed global endeavors for nuclear disarmament, but felt the nonproliferation hindered their development. It was the case of South Africa:

It follows from what I have said that South Africa fully supports in principle the objective of preventing the spread of nuclear weapons, and we would be ready at any time to play our part in an international effort to produce an effective and equitable treaty which meets this objective. The draft treaty before us has been presented to the Committee as one which conforms to this ideal. Certainly the Co-Chairmen of the Eighteen-Nation Committee on Disarmament deserve this Committee's commendation for the sincere and dedicated manner in which they have sought to implement the injunctions of the General Assembly concerning the non-proliferation of nuclear weapons. Having said this, I am bound to add, however, that we are not persuaded that the draft treaty fully meets all the requirements laid down by the General Assembly, nor indeed does it take into account the legitimate interests of those non-nuclear-weapon countries which have a major economic interest in the development of their own nuclear technology and nuclear resources²¹⁰.

However, these negotiations and concessions from NWSs facilitate the legitimization of the nonproliferation regime as an international attempt to preserve global peace. The Irish delegation argued:

On behalf of the Irish delegation — which is not an automatic admirer of great Powers — I wish to express our heartfelt gratitude to the Soviet Union and the United States for having overcome their differences and produced this draft treaty to stop the spread of nuclear weapons. We are also fateful to them and to Great Britain for giving assurances to defend against attack or threat of attack by a nuclear Power the non-nuclear-weapon States which ratify this treaty²¹¹.

Even countries that claimed the NPT must not hamper the development of nuclear researches from NNWS (e.g., Japan²¹²) adhered to the NPT. Promises that nonproliferation regime could solve many diplomatic skirmishes over this topic and reduce tensions convinced many NNWSs. It was another evidence the NWSs worked to convince other agents via social

²⁰⁹ Statement by Prime Minister Wilson on the Entry Into Force of the Treaty on the Nonproliferation of Nuclear Weapons, (5th March, 1970).

²¹⁰ Statement by the South African Representative (Botha) to the First Committee of the General Assembly: Nonproliferation of Nuclear Weapons, (20th May, 1968).

²¹¹ Statement by the Irish External Affairs Minister (Aiken) to the First Committee of the General Assembly: Nonproliferation of Nuclear Weapons, (6th May, 1968).

²¹² Statement by the Japanese Government on Signing the Non-proliferation Treaty (3rd February, 1970).

and diplomatic means. They tried to demonstrate the beneficial aspects of this treaty regardless the criticism of some countries. Hence, it created a system that stigmatized states who did not comply with rules as threats to global peace.

This section provided shreds of evidence to depict the two first grips of the Middle Power Trap. The institutionalization of the nonproliferation regime represented an insightful moment to observe the enacting of this causal mechanism. NWSs assumed a prominent role in these negotiations and received a global endorsement to hold this position. Although some great powers decided to avoid these discussions, they did not hamper their progress. In this sense, great powers negotiated with others their texts. They preserved their core interests and sustained a privileged position in mastering nuclear technologies. They promised to endorse other states to catch up with their level of S&T development (e.g., mastering atomic energy). Likewise, they assumed a commitment to denuclearization. Yet, they interfered NNWSs to follow their path by developing indigenously S&T programs to conduct nuclear-related studies.

5.4. Concluding Remarks

This chapter emphasized three elementary conclusions: (a) the nuclear proliferation regime surged due to a shared interest of states to reduce the risks of military-led usage of these technologies. (b) Nonetheless, great powers conducted this process and held sway over related initiatives. (c) Although it was a global demand, the proposed outcomes did not fulfill the initial tasks of establishing complete disarmament. Some countries did not agree with nonproliferation rules because they denounced discriminatory instances that underpinned regulatory mechanisms such as the NPT. Indian diplomats stressed how unpleasant were the terms of NPT to the interests of some NNWS:

Since nuclear technology is the technology of the future and is likely to become the most crucial and potent instrument of economic development and social progress, it would obviously be invidious for a greater part of the world to become wholly dependent on a few nuclear-weapon States for the knowledge and application of this technology. The proposed treaty creates a juridical discrimination between States according to whether they possess nuclear weapons or not, regardless of the fact that it is unwise to divide the world into a few “haves” and a lot of “have-nots”, who would become dependent on the goodwill of the “haves” in regard to development in the vital area of nuclear energy, thereby making them subject to pressures²¹³.

I confirmed that the power dynamics influenced the draw of fundamental nonproliferation instruments – for example, the NPT. By digging into UNODA’s archives, it is possible to unveil the proposed historical context to observe the hypothetical causal mechanism

²¹³ Statement by the Indian Representative (Husain) to the First Committee of the General Assembly: Nonproliferation of Nuclear Weapons, (14th May, 1968).

Middle Power Trap. NWSs gained legitimation to define global governance structures. Although many countries recognized that the NPT negotiations revolved around discriminatory practices that could hamper the S&T development in the Third World, NWSs promoted the understanding that it represented the possible consensus to attain nuclear disarmament and foster the peaceful use of these technologies. In the historical causal chain, I summarize what this dissertation has already uncovered as follows:

- The Cold War world order hinged on great powers' understandings and negotiations (5.1). Great powers were endowed with social legitimacy to organize global governance to avoid conflicts via diplomatic agreements and international instruments. International regimes revolved around this context: whereas agents demanded solutions for global puzzles, social dynamics hung onto hierarchical divisions where great powers enjoyed more assets than other states to preserve their interests.
- NWSs played a decisive role on defining nonproliferation rules and pushing for solutions according to their understandings (5.2). Although multilateral negotiations defined the nonproliferation regime, great powers influenced these arenas. Discussion about nuclear proliferation usually granted a sort of special role to NWSs. During ENDC debates to draw the NPT text, Washington, London, and Moscow defined the fundamental guidelines of the treaty. They abided by some regulations and promised to denuclearize their armies, but NNWSs had to acquiesce to surveillance mechanisms and reduce incentives to indigenous S&T programs.
- Great powers promoted the universalization of the NPT through demonstrating they abided by regulating instruments to promote nuclear disarmament and reduce threats to the world's peace (5.3). They convinced countries to acquiesce to the nonproliferation instruments such as NPT to promote arguably the diffusion of peaceful-led technologies – a market dominated by NWSs' companies. In this sense, the nonproliferation regime was legitimized as the possible effort to reduce nuclear menaces.

This chapter found the historical elements that demonstrated the Middle Power Trap exists. International agents legitimized regulating mechanisms. It enabled NWSs to work as protectors from the world order – that is, preserving the existing status quo. Despite Cold War disputes, the United States and the Soviet Union promoted the globalization of the NPT that reduced incentives for the development of S&T programs in emerging regional powers aiming to attain nuclear autonomy. The Middle Power Trap, in this sense, comprises the

instruments employed to preserve this architecture from challenging agents. The next chapter consists of an in-depth investigation to inductively identify which were instruments employed to lure Brazil into abiding by nonproliferation rules and adhering to bidding commitments such as the NPT.

6. BRAZILIAN NUCLEAR HISTORY

Brazilian nuclear history represented a typical case where Middle Power Trap avoided an emerging regional power to keep assuming a "deviant behavior" by adjusting the national policies to the expected behavior. This state gradually renounced many nuclear aspirations due to the social necessity of "normalizing" itself before its peers. Former President Fernando Collor told at the UNGA during the 1990: "Brazil today discards the idea of any experiments that might involve nuclear explosions, even if only for peaceful purposes²¹⁴". He completed the speech claiming Brazil was renouncing any sort of "outdated concepts of power". This step concluded a series of initiative that Brazilian administration undertook to convey an image of a peaceful country that would never use nuclear energy for military-led purposes.

Previously, the 1988 democratic Brazilian constituent assembly introduced Article 21, § XXIII (a), making the use of nuclear energy exclusive for peaceful purposes (joining New Zealand and Philippines as the only states to code this principle in national constitutions). Similarly, President Collor treated to close any possible site to be employed for nuclear tests in 1990. Brazil joined gradually the majority of nonproliferation mechanisms during the 1990s like the NPT in 1998. It finalized a process towards accepting the majority of the international demands around the field (GOLDEMBERG; FEU ALVIM; MAFRA, 2018; SPEKTOR, 2016). Such a move represented a sharply contrast from previous national diplomatic discourses that claimed Brazilian nuclear program would not accept any external interference over its sovereignty in this field²¹⁵.

Although many policymakers considered technological autonomy a strategic asset, global concerns increased due to suspicions that Brazil was hiding a military-aimed atomic project or pursuing technical assistance from other "deviant countries" – such as Iraq or Pakistan (see Patti 2018; Spektor 2016). In this sense, different sectors joined internal negotiations about national nuclear ambitions. Local policymakers assumed that these aims could hamper the national development and stigmatize the country in the international system. As the legislative decree from 1998 that allowed the adherence to NPT claimed, Brazil arguably needed to overcome an international isolation because regional partners and many countries had already accepted the NPT²¹⁶. Brazilian policymakers moved to a social understand that a

²¹⁴ UNGA. 1990. 'Address by Mr. Fernando Collor, President of the Federative Republic of Brazil'.

²¹⁵ Jornal do Brasil. 1978. "Geisel defende reformas de abril e promove mudanças". 2nd March 1978. In: CPDOC-FGV. Paulo Nogueira Batistas' Archive.

²¹⁶ Brazil. 1998. 'Decreto Legislativo nº65, de 1998'. [Portal da Câmara dos Deputados \(camara.leg.br\)](http://portal.da.camara.br). Consulted at 24th June, 2022.

reluctant position against the NPT would be harmful to national image before other countries – namely the United States and European powers²¹⁷.

This chapter tells this process that drove Brazil towards acquiescing to international nonproliferation rules. I sought to refine the proposed hypothesis through observed elements during this historical investigation – in other words, I conduct the bulk of the research to explain the outcome observed in the Brazilian case. In this sense, I divided this chapter into three blocs: (6.1) detailing the fundamental characteristics of the Brazilian nuclear history and S&T development during the Cold War (e.g., the main characteristics and motivations); (6.2) the challenges posed by the Middle Power Trap to reduce Brazilian incentives to assume a deviant position in the nuclear field; (6.3) concluding remarks. The main line of this chapter is to find pieces of evidence that demonstrate how NWSs employed nonproliferation instruments to make Brazil accept the traditional middle power's behavior the most desirable choice. This process tracing analysis delves into the features that enabled NWSs successfully pressure an emerging regional power to assume an expected outcome via the Middle Power Trap.

To summarize the main findings, I defend that Brazil is an absorbing case to analyze the Middle Power Trap because the country backed the right to draw an S&T-related policy free from foreign interference. However, this diplomatic discourse stumbled in domestic elements that did not permit a robust mobilization against the constraining elements from the Middle Power Trap. It is a relevant contrast between the official ambitions of mastering nuclear energy to promote economic growth and via indigenous-led technologies that employed foreign assistance to support local scientific centers²¹⁸ and the strategies employed even to cope with international pressures.

As I will pinpoint, this country has not defined a full-fledged nuclear policy that lasted the needed period to produce indigenous outcomes. Policymakers changed their plans due to political interests and governmental changes. Although the ideational principle of attaining nuclear autonomy and S&T prestige persists, policymakers thought more about the results than the means to achieve them. In this sense, this country employed foreign assistance as a shortcut to advance the national nuclear program without investing the needed funds to

²¹⁷ Brazil. 1996. 'Confidential Telegram from the Brazilian Embassy in Washington: Visita do Secretário de Estado. Não-Proliferação. Pontos de Conversação'. In: FGV-CPDOC. Luiz Felipe Lampreia Personal Archive. 26th February 1996.

²¹⁸ Brazil. Ministry of Foreign Relations. 1967. "Aviso nº 18-2S-SG/CSN-BSB [Secreto]". 24th October 1967. In: CDPOC-FGV. Paulo Nogueira Batistas' archive.

promote indigenous scientific projects. It hampered the development of a robust nuclear industry and consolidated a dependence on imported technologies from NWSs.

Thus, this chapter reinforces the confidence in the proposed hypothesis by depicting the “direct” and “indirect” ways sparked by the Middle Power Trap to produce an expected outcome. Brazil faced trade restrictions, potential diplomatic stigmatization, and S&T-related pressures to reduce national interests in attaining nuclear autonomy. Although Brazilian administrations tried to overcome these hurdles, policymakers gradually decided to abide by rules or promote middle-ground understandings by establishing regional agencies to implement safeguard policies in tandem with IAEA guidelines (i.e., the ABACC in 1991).

6.1. The Development of Brazilian history in the Nuclear Field: fundamental elements to take into account.

Brazil joined the world’s nuclear history since the very beginning. Endowed with large reserves of minerals, documents illustrated the foreign interests over local nuclear-related elements since the 1880s²¹⁹. Some local sources of natural resources were already widely known even during 1940s. As previously remembered by Patti (2021), Hitchcock’s thriller *Notorious* (1944) gravitated over a fictitious story about a Nazi initiative to explore uranium from Brazil. In so being, European enterprises enjoyed the erstwhile lack of robust national regulations to import monazite sands, a phosphate mineral that contains thorium, rare-earth elements, and uranium. An English engineer, John Gordon²²⁰, based in Cumuruxatiba (Bahia) established a profitable system to export – or smuggle - this sand to overseas companies. It raised complains from local authorities (JULIAO, 1998; ROSA, 2013). Over time, monazite exploration was spread to other regions such as Guarapari (Espírito Santo).

During that time, the production of incandescent mantle through oxide of thorium (ThO²) and cerium nitrates motivated this interest over atomic-related raw materials. This context triggered real concerns²²¹ in the Brazilian society since they were neither receiving fair payments nor seizing the opportunity to use local resources. According to official sources, these foreigner buyers paid less than US\$10/ton (LOUREIRO; SANTOS, 2013). Domestic pressure

²¹⁹ SBPC. 1956. “Ata do Simpósio sobre a utilização da energia atômica para fins pacíficos no Brasil”. In: SBPC. *Primeira Reunião Realizada da SBPC*. 1956.

²²⁰ Brazil. 1927. “Relatório do Ministério da Fazenda (RJ (1891 a 1926))”. Ministério da Fazenda. Accessed at 9th June, 2022: <http://memoria.bn.br/DocReader/DocReader.aspx?bib=873683&pesq=monaz%C3%ADtica&pasta=ano%20190&hf=memoria.bn.br&pagfis=11482>

²²¹ *Jornal do Commercio*. Requerimentos. (17th September, 1902), p.2.

required to the national government to revoke Gordon's exploratory concessions rights²²², impose new taxes and set regulatory mechanisms and a surveillance system conducted by the navy during the 1900s. However, Brazilian government issued only in 1934 the first national decree regulating mining activities. In 1949, the newspaper *Correio Paulistano* published a text that Brazil needed to set industrial policies to refine monazite sands – taking into account the experiences observed in India where these elements were nationalized²²³.

By the development of nuclear studies, these natural aspects called attention from the scientific field. For example, Marie Curie²²⁴ visited the Brazilian town, Águas de Lindoia (São Paulo), because of the radioactive level found in local reserves of water. She gave a speech for medicine undergraduate students from Belo Horizonte – among them, Juscelino Kubistchek. Local scientists were aware about academic advances in the atomic area. The ABC was established in 1916. It worked to convince politicians about the need to provide sufficient budgets from scientific researches and promote initial forums (DE ANDRADE, 2006). Whereas local authorities established university in São Paulo (1934), many lectures over nuclear issues were organized with the participation of Albert Einstein and Enrico Fermi²²⁵ (PATTI, 2021). During this period, the national system higher education in natural science flourished (WROBEL, 1992).

At USP, Professor Gleb Wataghin led the inauguration of first Department of Physics, in which local students had their initiation on nuclear matters. During the 1940s, the Brazilian Navy started to study the uranium fission (OLIVEIRA, 1991). Likewise, Brazilian scientists, such as Costa Ribeiro, César Lattes²²⁶, Jayme Tiomno and the navy captain Álvaro Alberto, established in 1949 a scientific organization (MARZO; DE ALMEIDA, 2006). In 1953, Oppenheimer gave a lecture in Brazil suggesting that local authorities to establish a national research council to improve local knowledge over nuclear issues²²⁷. Furthermore, Brazil was the first Latin American state to conduct researches using radioisotopes²²⁸. The blossoming interest on atomic studies, during this period, drove Brazilian scientists to enroll in

²²² Jornal Oficial. Juízo Federal. (11th April, 1905), p.1.

²²³ Correio Paulistano. Negócios da China: A Política da Monazita no Brasil – A Necessidade de Industrialização daquele produto – o exemplo da Índia. (6th October, 1949).

²²⁴ Jornal do Commercio. Sociedade de Geographia: Homenages prestadas hontem à Senhora Curie – As saudações trocadas”. (28th August, 1926), p.3.

²²⁵ Estado de S.Paulo. Universidade de S.Paulo. (22th August, 1934), p.5.

²²⁶ Lattes was a physicist that detected the artificial production of pions in a cyclotron.

²²⁷ Oppenheimer, Robert, Palestra realizada na 162ª Sessão do Conselho Deliberativo do Conselho Nacional de Pesquisas. (28th July, 1953).

²²⁸ Estado de São Paulo. Pioneiro o Brasil em Medicina Nuclear. (12th November, 1958), p.9.

courses taught in foreign universities – it was the case of Marcelo Damy and Hervásio de Carvalho. After the WWII, European academic support organizations (e.g., DAAD) reestablished their scholarship programs in Brazil (NUNES, 2021). It enabled the consolidation of a livid and trained-abroad Brazilian scientific community (Spektor 2016).

Therefore, Brazilian interest over the atomic revolution blossomed concomitantly to rise of this field in the great powers. In the United States and Western Germany, companies (e.g., General Electric) and laboratories set research centers to accumulate expertise on technological fields (ROSA, 2013). Local businesspersons established, tied with foreign capital, mining enterprises to refine atomic materials like monazite sands – e.g., the private company Orquima S/A²²⁹ inaugurated in 1942. It is worthwhile to mention that the owners of this factory were the Société des Produits Chimiques des Terres Rares and actionists such as Wolf Klabin and the diplomats Horácio Lafer and San Thiago Dantas (De Almeida 2006). Another example were Sulba S.A and MIBRA – a company inaugurated due to a partnership with French mining organizations interested on extracting monazite sand from Guarapari. Such an industrial activity prospered. Orquima S/A supplied the United States authorities oxide of europium to produce the first nuclear-powered submarine (USS Nautilus) (SERRA, 2011).

The first robust scientific mechanism, linked to the National Presidency Staff, was created to deal with atomic issues was the CNPq (National Law 1.310), in 1951, to encourage local research and regulate/prohibit the exports of some crucial minerals such as uranium, thorium, rare earth, and lithium. Also, it promoted seminars and lectures about nuclear studies with Nobel laureate scientists such as Isidor Rabi, Eugene Wigner, and Emile Segrè (De Almeida 2006). The relevance given to the atomic field and physics domain inside the national committee on research triggered some concerns from other scientific areas. Some works stated that researchers criticized the initiative to focus mainly on the development of a specific scientific field while other realms did not receive the same budget (see De Andrade 2006). Nonetheless, the CNPq resulted from huge efforts employed by Brazilian scientists who advocated that it was a necessary condition to lead Brazil to a highlighted position among “civilized nations²³⁰” and spark new improvements in other scientific fields (SPEKTOR, 2016).

²²⁹ Brazil. National Congress. Decree nº 27089. (25th August, 1949).

²³⁰ Conselho Nacional de Desenvolvimento Científico e Tecnológico. 1951. Exposição de Motivos: enviada ao senhor presidente da República, General Eurico Gaspar Dutra, pela Comissão incumbida de elaborar o anteprojeto de estruturação do conselho nacional de pesquisas

As remembered during the interview with José Goldemberg (2022) and reported by documents²³¹, military officials endorsed the creation of such committee. An example of concurrence between military officers and scientist was the decision to acquire from the University of Chicago a synchrocyclotron to study the particles' speed during the 1950s²³². The CNPq attempted to emulate similar organizations located in the United States, Western Europe and the Soviet Union. Therefore, the CNPq was an initial attempt to convey a national message that Brazil wanted to catch up great powers in prestigious activities and use technological elements to develop economy (Leal 1982).

It was the first explicit official move to draw a nuclear policy because this initiative came in tandem with diplomatic and scientific partnerships. Brazil developed nuclear ties with countries such as West Germany, France, the United States²³³, Italy, and Norway (Patti 2021). Whereas Brazilian scientists, led by Álvaro Alberto during 1950s, attempted to obtain necessary knowledge to build natural uranium reactors from Canada and France, they maintained close ties with the United States and Norway to master other techniques (De Almeida 2006). As reported during the twentieth session of the Brazilian National Security Council: “[I]n the international field, the Brazilian program for the production of nuclear energy must take advantage of the scientific and technological experience of all friendly countries, guided only by the criterion of convenience²³⁴”.

Brazil has sought international cooperative ties since the beginning of the nuclear age (Patti 2021). As remembered by Ivan Salati (2022), that international importance is the reasoning behind the Brazilian substantive diplomatic engagement during initial multilateral negotiations in the UNAEC. The navy captain Álvaro Alberto was appointed by Itamaraty to represent the country in more than two hundred sessions – chairing some of them – from 1946 to 1949. Brazilian diplomacy has been active in nuclear issues since the initial attempts of creating an international regime revolved around the North-South cleavages.

Being part of a geopolitical-related global market, atomic issues are intertwined with foreign policy's decision – e.g., preference for trade negotiations with allies. For instance,

²³¹ CNPq. Parte das notas taquigráficas da 364a.sessão ordinária, realizada em 25 de janeiro de 1955, à qual, compareceu, como convidado, o Senhor Almirante Alvaro Alberto, Presidente do Conselho Nacional de Pesquisas. (25th January, 1955). In: Acervo do Mast.

²³² Estado de S.Paulo. “Chegou ao Rio o Sincro-Ciclotron”. (10th March, 1954).

²³³ Brazil. Aide-Memoire. 1951. In: CPDOC-FGV. Paulo Nogueira Batista Library.

²³⁴ Brazil. Minutes of the Twentieth Session of the Brazilian National Security Council, Second Brazilian Nuclear Plan," (30th August, 1956), In: History and Public Policy Program Digital Archive, National Archive (Brasília). Obtained and translated by Fundação Getúlio Vargas. <https://digitalarchive.wilsoncenter.org/document/116913>

foreign agents from the United States propelled initial geological researches on Brazil uranium mines during 1950s²³⁵. Nevertheless, this country has also complained about its constrained voice in global arenas since the initial initiatives of drawing international organizations. For example, Brazilian diplomacy renounced, in 1926, its League of Nations membership because it considered a closed mechanism working for the interests of a few countries²³⁶. Become a great power is long-lasting ambition for Brazil²³⁷. In 1967, the Brazilian government issued a secret document about nuclear topics stating the country was able to become a leading member in the global arena²³⁸. Because of the world's increase demands for electric power during the Cold War (SPEKTOR, 2020), Brazilian officials reinforced the standpoint that mastering nuclear energy was a step forward to the national development among other states²³⁹ - an objective that called attention from great powers, as documents from the United States demonstrated²⁴⁰.

This search for status influenced and mobilized various national public policies. Since international mechanisms advanced in fields considered crucial to the development of the country²⁴¹, Brazilian diplomacy assumed a reactive instance to protect national ambitions – when it did not play a role of decision-maker. In this sense, national plans to achieve technological progress were included in the foreign policy's agenda²⁴². As demonstrated by the former military president Costa e Silva in a speech, national diplomatic body played a relevant role to safeguard Brazilian plans to achieve top-notch technological development and solve economic problems²⁴³. The quest for autonomy is considered a paradigm observed throughout

²³⁵ Estado de S.Paulo. As pesquisas de Urânio no Território Brasileiro: O programa de trabalho elaborado pela comissão brasileiro-americana. (10th December, 1955), p.48.

²³⁶ Estado de S.Paulo. O Ponto de Vista do Brasil, Segundo Declaração do Sr. Mello Franco. (10th August, 1926), p.4.

²³⁷ Jornal do Commercio. “La Prensa” occupa-se dos armamentos dos Brasil – um convênio de aeronavegação com o Uruguaý – A companhia do Colon – A nova sede da legação brasileira. (20th May, 1922), p.2

²³⁸ Brazil, Política Nacional de Energia Nuclear. In: FGV-CPDOC. Arquivo Paulo Nogueira Batista. (5th May, 1967).

²³⁹ Batista, Paulo Nogueira. 1979. ‘Discurso Proferido pelo Embaixador Paulo Nogueira Batistas, Presidente da Nuclebrás, por ocasião da visita de sua excelência, o senhor presidente da República, ao Complexo Mina-Usina de Poços de Caldas’. In: FGV-CPDOC. Arquivo Paulo Nogueira Batista (22nd February 1979).

²⁴⁰ United States. 1974. “Media Reaction Report – April 11-15”. In: The National Archives. Central Foreign Policy Files, created 7/1/1973 - 12/31/1979, documenting the period ca. 1973 - 12/31/1979 - Record Group 59. See: <https://aad.archives.gov/aad/createpdf?rid=75672&dt=2474&dl=1345>

²⁴¹ Brazil. Subsídios para as consultas entre o Brasil e os Estados Unidos da América sobre os problemas globais da não-proliferação de armas nuclear. (Secreto-Exclusivo In: FGV-CPDOC. Arquivo Paulo Nogueira Batista. (26th February, 1977).

²⁴² Visão. Política Nuclear: Os projetos, as alternativas e o mistério. (9th September, 1974).

²⁴³ Costa e Silva, Arthur. 1967. ‘Pronunciamentos do Presidente da República Marechal Arthur da Costa e Silva’. In: Revista Brasileira de Política Internacional. N°37-38.

Brazil's diplomatic history – at least in the discursive level. Official documents²⁴⁴ claimed the existence of a long-lasting Brazilian struggle to attain autonomy in strategic areas to provide bases for its development and avoid undesirable foreign interference²⁴⁵.

Brazil, in this sense, faced a thorny issue. It was a country endowed with natural resources, but it still had to engage in a robust industrialization process. The idea to explore the atomic option was intrinsically related to initiatives for boosting the national economy by obtaining electric power from a new source. Since Getúlio Vargas' authoritarian administration (1930-1945), Brazil attempt to move from agricultural-led economy to an industrial nation. This ambition mobilized many political strategies, including foreign policy and energetic initiatives (FERNANDES, 2015). Official documents to the president Eurico Dutra demonstrated the interests of some experts to employ the possibilities enacted by atomic studies to strength industrial sector²⁴⁶

According to Wrobel (1992, 52):

As a nation eager to industrialise and gain access to modern technology, Brazil intended to enter the nuclear age not only as a passive spectator, as it felt itself to be up to this moment, but with the aim to raise its influence in world affairs and to protect her interests.

Official authorities have denied the military-led use. All interviewed confirmed this idea and ambassador Castro Neves told only few military officers nourished a dream to rely on this asset to protect national sovereignty. Diplomatic agents constantly reaffirmed this context: “Brazil's stance on this issue is clear and well-known: we do not envisage the production of nuclear weapons in our country but we must be able to develop our nuclear capacity for peaceful purposes”²⁴⁷. Whereas the army developed a rocket program at Marambaia and conducted, in 1953, an experiment with an implosion bomb (Patti 2021), these initiatives did not obtain robust endorsement from decision-makers. In this sense, these aims were not fully divergent from possible mechanisms of global safeguards:

Brazil unequivocally supports the idea of a fair and equitable non-proliferation treaty that would effectively prevent the risk of the spread of nuclear weapons while encouraging the

²⁴⁴ Brazil, Política Nacional de Energia Nuclear. In: FGV-CPDOC. Arquivo Paulo Nogueira Batista. (5th May, 1967).

²⁴⁵ Brazil. 1975. ‘Acordo de Cooperação Nuclear com a República Federativa da Alemanha: suas razões e características’. [Secret]. In: FGV-CPDOC. Arquivo Paulo Nogueira Batista.

²⁴⁶ Conselho Nacional de Desenvolvimento Científico e Tecnológico. 1951. Exposição de Motivos: enviada ao senhor presidente da República, General Eurico Gaspar Dutra, pela Comissão incumbida de elaborar o anteprojeto de estruturação do conselho nacional de pesquisas.

²⁴⁷ Guerreiro, Saraiva. 1984. “Lecture delivered by the minister of external relations of the federative republic of Brazil at the Indian International Centre”. 5th March, 1984.

fullest use of nuclear energy, in all its forms, for the economic and social advancement of all peoples²⁴⁸.

In this sense, the regional dimension played a crucial role. Brazilian relationship with Argentina and a kind of South American dispute for influence cannot be disassociated from the reasoning behind the Brazilian nuclear development. Unlike other regional rivalries, this South American context did not gravitate on a history of wars and territorial disputes. Yet, these two countries established nuclear programs during the Cold War when they faced some punctual frictions due to both the lack of transparency of their military intentions and geopolitical disputes for prestige and relevance on multilateral organizations. As previous researches demonstrated, it was not possible to claim the existence of a ‘nuclear arms’ run’ between Brasília and Bueno Aires. Spektor (2016, 636) stated:

Contrary to conventional wisdom, the argument here additionally contends that the rivalry with neighboring Argentina never really spilled over to the nuclear field. For all of the misperceptions and low levels of trust that have historically marked the relationship between the two countries, security-dilemma dynamics do not satisfactorily account for Brazil-Argentina nuclear relations.

Indeed, the Brazilian intelligence was aware that some Argentinian military officers were keen on producing nuclear explosive artifacts. For instance, Brazilian authorities, during the 1970s, shared some concerns over Buenos Aires initiatives with India in the nuclear realm (PATTI, 2021). However, official documents²⁴⁹ stated regional causal factors motivated disputes in the “big science field” and promoted cooperative ties between these two countries. For example, Brazilian authorities knew that Argentinians, such as General Osiris Villega, were keen on making the country a nuclear power at least in terms of mastering the existing technology²⁵⁰. Similarly, Argentinian intelligence feared that Brazil could develop a nuclear bomb during the 1960s and, indeed, investigated the advances gauged by the neighbor in terms of nuclear issues²⁵¹.

Nonetheless, a myriad of documents demonstrated that Argentina and Brazil nourished mutual cooperative interests during the Cold War. For example, Buenos Aires considered selling enriched uranium to Brazil in 1969 – a transaction that did not happened due to

²⁴⁸ Statement by the Brazilian Representative (de Araujo Castro) to the Eighteen Nation Disarmament Committee: Nonproliferation of Nuclear Weapons, February 8, 1968.

²⁴⁹ Brazil. 1980. “Abertura da Entrevista Coletiva à Imprensa, no dia 20/05/80, do Embaixador Paulo Nogueira Batista. Presidente da Nuclebrás. In: FGV-CPDOC. Arquivo Paulo Nogueira Batista.

²⁵⁰ Brazilian Ministry of Foreign Relations. 1974. ‘Informação para o Senhor Presidente da República’ [Secret]. In: FGV-CPDOC. Arquivo Paulo Nogueira Batista. (21st May 1974).

²⁵¹ Argentina. 1967. "Argentina Naval Intelligence Service, 'Brazil: Prospects in the Field of Nuclear Energy'", July 6, 1967, Wilson Center Digital Archive, Rodrigo Mallea Archives <https://digitalarchive.wilsoncenter.org/document/121347>

diplomatic concerns²⁵². Both established mutual partnerships on the peaceful use of nuclear energy in 1980. Brazil imported zirconium alloy from Argentina during that time, as remembered in the interview with Marco Marzo. Likewise, Brazil signed many agreements with Latin American countries on nuclear matters – e.g., Paraguay (1961), Peru (1966, 1981), Bolivia (1966), Ecuador (1970), Colombia (1981) and Venezuela (1983). Finally, Brazilian authorities criticized the NWSs to provoke supposedly rivalries among Latin America in the S&T field²⁵³ and thereby I will pay close attention not to reply possible geopolitical bias (i.e., allocating the Indian-Pakistani logic into this context).

As demonstrated, Brazil has attempted to advance on S&T topics related to atomic elements. The official idea has always been that the country needed to seize the opportunity of mastering and develop nuclear technologies to achieve international prestige and overcome economic hurdles²⁵⁴. Mastering sensitive use of nuclear technologies and using this energy to boost national economy was considered a scientific prowess. Despite the widespread concerns over Hiroshima's devastation, Brazilian scientists considered understood nuclear technologies a proxy for modernity (ADLER, 1987; SPEKTOR, 2016).

Yet, as demonstrated previously, the nuclear field involved international mechanisms and mobilized global concerns and diplomatic efforts that upset Brazilian plans. As Vinhas (2022) explained, the Brazilian nuclear program faced a stigmatization since some countries avoided establishing commercial ties over products that could be used in nuclear activities – regardless the Brazilian official discourse. Local diplomats heavily criticized these pressures against national plans²⁵⁵. Such international context played a relevant role because many domestic groups wanted to avoid sources of friction in Brazilian foreign policy (PATTI, 2021; WROBEL, 1992).

²⁵² Argentina. 1969. "Memorandum by Head of Planning Department of the National Atomic Energy Commission José Luis Alegria on Brazil's Request for Uranium", January 31, 1969, Wilson Center Digital Archive, Critical Oral History Conference on the Argentine-Brazilian Nuclear Cooperation, Rio de Janeiro, March 2012. <https://digitalarchive.wilsoncenter.org/document/123278>

²⁵³ Silveira, Antônio Azeredo da. 1977. "Ministry of Foreign Affairs Information to the President, 'Secretary of State Cyrus Vance's Visit'", November 30, 1977, Wilson Center Digital Archive, Ernesto Geisel Archive/CPDOC. Critical Oral History Conference on the Argentine-Brazilian Nuclear Cooperation, Rio de Janeiro, March 2012. <https://digitalarchive.wilsoncenter.org/document/123287>

²⁵⁴ Brazil. 1974. "Memorandum, Information for the President of Brazil, No. 055/74 from the National Security Council," August 13, 1974, History and Public Policy Program Digital Archive, Centro de Pesquisa e Documentação de História Contemporânea do Brasil (CPDOC), Azeredo da Silveira Archive, AAS1974.o8.15 mre/pn [1/661]. Obtained and translated by Fundação Getúlio Vargas. <https://digitalarchive.wilsoncenter.org/document/116915>

²⁵⁵ Pinto, Magalhães. 1968. "Discurso do Chanceler Magalhães Pinto, na Assembleia Legislativa da Guanabara (22th November, 1968). In: FGV-CPDOC. Arquivo Paulo Nogueira Batista.

To understand the causal force made by the Middle Power Trap in the Brazilian nuclear history, it is necessary, however, to assess the nuclear policy as a whole. This is not just about diplomatic skirmishes because this is not the group responsible for taking decisions in the atomic field (see Wrobel 1986; de Lima 1986). The nuclear policy involved a myriad of national sectors – e.g., scientists, politicians, military officials, governmental employees, and diplomats – due to the linkages with other areas: foreign policy, defensive, environmental, and energetic strategies and financial decisions (see Dalaqua 2017). It involved many ministries and national organizations or holdings, which changed according to the administration. National understandings about nuclear energy could be modified due to changes of administration, contextual factors or decisional divergences. For instance, an energetic dilemma for Brazilian administrations has been whether it is necessary to invest on atomic centrals in a country endowed with robust hydraulic potential²⁵⁶ (see Goldemberg 2022; Silva 2022). Despite the official discourse to maintain a nuclear project, this is an ongoing debate influenced by different fields and decisions.

Likewise, international relations do not only happen in diplomatic or military events. As previously discussed, the spread of awareness and subject values also played a decisive role (see Adler 1992). Decisions taken can result from social understanding about what would be the best option in terms of time, price or technology. Very often, these decisions are not compatible with what would be the best option in terms of national development and autonomy achievement. Furthermore, these decisions can be subverted in a next future due to the lack of robust long-lasting strategy. Hence some apparently domestic-level decisions are driven by international subjective issues. Likewise, these actions interfere in the possibilities of a country cope with the Middle Power Trap.

In so being, the direct consequences of the establishment of a nonproliferation regime hampering such a technological achievement are well known. Yet, our interviews demonstrated that many erstwhile decision-makers, scientists, and pundits considered such a perspective too simplistic. Blaming exclusively foreign interference for the hurdles faced by Brazil in nuclear history does not consider domestic causal factors that hampered the draw of robust plans and encouraged the national decision to abide by global rules. For instance, a text published by the conservative newspaper *Estado de S.Paulo* claimed the main reasons that Brazilian nuclear policy coped were domestic-born issues such as reduced budget, scientific disputes and

²⁵⁶ CBTN. Diretoria de Tecnologia e Desenvolvimento. Programa Nuclear de Referência. (Abril, 1974). In: FGV-CPDOC. Arquivo Paulo Nogueira Batista.

negative public opinion²⁵⁷. In so being, a scholar interviewed called attention to do not replicate a constantly replied version of Brazilian nuclear history that shifts the blame for failure to arguably foreign pressure and treat some military agents as national heroes. Alvaro Alberto, for example, became also a sort of consolidated visionary of nuclear technology due to his work on coping with foreign restrictions (Dalaqua 2019).

This research questioned all interviewed agents, based upon *ad posteriori* perspectives, about which hurdles Brazil faced while establishing a nuclear program. The majority answered the lack of a long-lasting plan and budget. Although international pressure against the development of national nuclear projects, it was not considered as substantive as the changes of understanding about how to develop this energetic policy. During the interview with Olga Simbalista (2022), she blamed governmental discontinuances in establishing robust strategies to the hardship faced by the Brazilian nuclear history. Unlike some IR previous studies focused only on the international arena, these finds unveiled domestic disputes regardless of the maintenance of regular discourse aimed to demonstrate the interest of employing nuclear energy in the national development. I noticed this context represented an important feature to the explain the results obtained by the Middle Power Trap.

It is possible to notice that these skirmishes and lack of long-lasting and continuous strategies on nuclear energy reduced the chances of Brazil facing direct international pressure – e.g., sanctions, diplomatic pressure, etc. Without a concise ambition to sustain a national atomic plan, it is easier to influence decision-makers or make them believe their country took the wrong path via stigmatization. Therefore, lowering the level of abstraction to investigate even domestic disputes can also reinforcing the importance of a system causal mechanism to not only constrain some political decisions but also to demonstrate how it inference in the draw of the nuclear policy.

For instance, there is a political dispute between different strands about how to establish Brazilian nuclear policy. Such debate usually revolves around domestic political disputes, but it is crucial to tell the nuclear history of Brazil. On the one hand, there is a traditional nationalist group aimed to restrict the use of local minerals and human resources to produce indigenous-led technologies without relying on foreign assistance in the long term. On the other hand, there

²⁵⁷ Estado de S.Paulo. O Brasil na Era Atômica: Formação de técnicos e instalação de reator de potência como objetivos. (12th November, 1958), p.9.

were groups, derogatory so-called “*entreguistas*²⁵⁸”, who endorsed the acquisition of technologies and machines from overseas and attempt to assure the maintenance of positive ties with great powers. Instead of using the name *entreguistas* that carry a political interest from the opposite side (e.g., to call them anti-patriotic citizens), this research employs the term henceforth “utilitarians²⁵⁹” – since they attempt to solve particular problems through easy solutions (e.g., buying foreign made reactors)²⁶⁰.

It is worthwhile to mention that this debate is usually depicted according to political biases. As this research demonstrates, there are events in which members of nationalists concurred with utilitarians due to economic reasons or international elements. There are moments when some nationalists advocated for partnerships with foreign agents instead of supporting the production of reactors indigenously – assuming it could streamline the development of nuclear policy by jumping some steps. National decisions and policies can divide, in this sense, these macro-groups into factions. Similarly, these political biases blurred analyses whether a decision was nationalist- or utilitarian-minded activities. For example, the 1974 Nuclear Agreement with Western Germany triggers different standpoints if it represented an initiative to master indigenously nuclear techniques or an expensive²⁶¹ option that reduced the interest on national projects.

This context led towards decisional disputes -making it easier the work of the Middle Power Trap. In this sense, dilemmas such as choosing between PWR and HWR line of reactors, using enriched or natural uranium or thorium, funding national research to build indigenous reactors and centrifuges or buying them from international partnerships were subjects where the Middle Power Trap operated. As the magazine *Visão*²⁶² claimed, in 1974, these decisions unveiled different perspectives on economic, technological and strategic ideas about the use of nuclear energy. These decisions choose which group receives financial resources or who is trained to achieve a selected goal.

²⁵⁸ This is a reference to the verb in Portuguese “entregar” that means “to deliver”. People who were entitled as *entreguista* were in favor of privatizing enterprises to foreign agents or preferring international partnerships rather than national initiatives.

²⁵⁹ The decision to employ a reference to the Mill’s theory of Utilitarianism happened after the interview with Ivan Salati. He said that many Brazilian decision-makers attempt to find reduced-costs solutions to solve specific crises.

²⁶⁰ Previous studies attempted also to solve this issue calling some agents that aimed to develop a national nuclear policy via foreign assistance ‘non-nationalist developmentalists’ (see de Andrade and dos Santos 1990).

²⁶¹ *Tages Anzeiger*. A Desastrada Decolagem do Brasil para a Era Atômica: A Aventura Nuclear Prepara ao País Surpresas Caras e Desagradáveis (06th September, 1978). In: Museu da Eletricidade.

²⁶² *Visão*. Política Nuclear: Os projetos, as alternativas e o mistério. (9th September, 1974).

Both nationalists and utilitarians were interested in establishing a Brazilian nuclear program. Despite the existence of movements against the use of atomic technologies, these two macro-groups were, at least, in favor of the national initiatives to explore this option. Utilitarians were more sensitive to grievances against nuclear decisions. As demonstrated, their differences revolved around how to draw this policy. Political disputes between utilitarians and nationalists illustrated the influence of foreign actors in the nuclear context during some historical events. However, the fact that some agents endorsed less abrupt initiatives against great powers' interests does not depict the whole image. Decisions such as dropping out of national programs to indigenous produce reactors and master the full cycle of nuclear fuel because decision-makers were convinced that importing products would be a better choice are elements to be analyzed.

The Middle Power Trap, through different mechanisms, tries either to make nationalists acquiesce to the interests of utilitarians or to reduce the formers' relevance. Hence, this dispute on finding the best manners to draw an atomic policy is an essential part of Brazilian history in this matter. Beyond the direct consequences triggered after the nonproliferation regime entered into force, it is relevant to understand how international influence lures national groups to follow a given way.

As previously demonstrated, the consequences of the nonproliferation also sustained subjective forces that stigmatize deviant interests and reduced the incentives for nationalistic initiatives. In this sense, these domestic issues are not dissociated from international relations. This study includes this dimension because of the theoretical framework. For example, great power programs, e.g., Atoms for Peace, worked to promote nuclear energy and enterprises in the United States. This research delves into what it meant for the Brazilian national program that aimed to indigenously master atomic technologies and use this asset for local development.

In conclusion, this section presented absorbing topics for the research. Firstly, Brazil has joined the global nuclear history since the very beginning as a supplier of raw materials to great powers – mainly the United States and European countries. It is a relevant aspect because the development of national scientific interests coped with the international role imposed on the country. As I will demonstrate in the next section (6.2), Brazil tried to overcome these hurdles by facing the Middle Power Trap. Secondly, this country tried to use nuclear energy for promoting national development and believed that S&T could bring international prestige. These elements reinforced national interests in mobilizing resources to safeguard the right to master atomic energy and industrialize the country. Thirdly, domestic agents influenced the

capacity of a country to respond to the Middle Power Trap. It is important evidence for the analysis because this context influences the outcome.

Finally, as I pointed out, Brazilian agents tried many times to define national nuclear plans or mechanisms to protect their programs from foreign interference or negative opinions – for example, documents from 1956 illustrate the governmental concerns to enhance the image of local S&T programs within national people via propaganda instruments and establishing programs to intensive prepare scientists²⁶³. Nonetheless, elements that I will present next shed light on how a country that defined attaining nuclear autonomy a fundamental goal was caught by the Middle Power Trap. In this sense, the next section addresses Brazilian ties with other countries on nuclear matters and how international pressures sparked consequences in the national atomic program.

6.2. Brazil and the Middle Power Trap

This section describes how the Middle Power Trap worked to convince Brazil to renounce from a deviant position in terms of nuclear nonproliferation. This section describes how the Middle Power Trap worked to convince Brazil to renounce a deviant position in terms of nuclear nonproliferation. The idea is firstly to reinforce that foreign agents are core actors in understanding the development of the Brazilian nuclear program. Indeed, I sought to find pieces of evidence that enhance my hypothetical proposition that the international hierarchical context opened doors to the creation of instruments that hampered S&T policies in emerging regional powers.

The following two subsections (6.2.1 and 6.2.2) depict the direct and indirect ways employed to pressure the Brazilian nuclear program. Since the indirect ways describe the incentives to make Brazil become dependent on foreign technologies via convincement, I divided this subsection into two parts. (6.2.2.1) I depicted the initiatives to stigmatize Brazil diplomatically and boycott S&T projects. (6.2.2.2) I unveiled the initiatives to enhance the national dependence on imported technologies through foreign assistance.

Brazilian nuclear history has a close relationship with the United States. Although this state attempted to carve out various partnerships with a plethora of states, the United States is the great power that most influenced the Brazilian atomic development. Whereas Washington

²⁶³ Brazil. 1956. "Minutes of the Twentieth Session of the Brazilian National Security Council, Second Brazilian Nuclear Plan", August 30, 1956, Wilson Center Digital Archive, National Archive (Brasilia). Obtained and translated by Fundação Getúlio Vargas. <https://digitalarchive.wilsoncenter.org/document/116913>

established many cooperative ties with Brazil in nuclear matters, this country has been heavily criticized due to their interference in Brazilian atomic policy²⁶⁴. The United States' attempts to influence the Brazilian nuclear policy was observed chiefly through diplomatic initiatives and Washington's aim to globalize the nonproliferation regime.

Indeed, the United States was not the only country that imposed some hurdles to an autonomous nuclear program capable of mastering the production of atomic-related fuels and technologies. Yet, the global relevance of the United States and its commitment to make the Western Hemisphere a sphere of influence converted Washington's role into a major source of friction among Brazilian decision-makers. Likewise, the United States showed some reluctance to endorse Brazil's nuclear plans because of economic reasons. For instance, Washington turned down initial proposals to build a power plant in Brazil, during the 1950s, due to the lack of wherewithal to fulfill this idea (see Patti 2021).

As previously claimed, Brazil's nuclear development was disputed between groups that diverged about the role played by foreign agents in this process during the Cold War. Departing from a privileged position to develop autonomously nuclear projects (PATTI; SPEKTOR, 2020) and knowing that atomic technologies represented a prestigious scientific asset and a mechanism to safeguard national plans, many Brazilian agents suspected great powers' movements. During the interviews, a recurrent question was citing an example of foreign interference in the Brazilian atomic history.

It is worthwhile to remember that this dichotomist position of wanting to join the nonproliferation structures as a rule-maker and facing thorny relations with great powers was observed in the Brazilian approach to multilateral instruments such as IAEA negotiations. As Marzo (2022) claimed, Brazil attempted to play many efforts to insert its interests into the negotiations of the IAEA's structure and aims (see subsection 6.2.2). Other interview and sources²⁶⁵ attested Brazilian authorities favored the establishment of an agency that take into consideration local ambitions to promote the use of nuclear energy. From the very beginning, Brazil developed proactive diplomacy within IAEA as a reaction to indirect ways employed to cue Brazil into the group of NNWSs.

²⁶⁴ United States. 1976. "US Embassy Cable, Brazilian Public Reaction to US Nuclear Policies," November 19, 1976, History and Public Policy Program Digital Archive, National Archives and Records Administration (NARA), Record Group 59, Central Foreign Policy Files, created, 7/1/1973 - 12/31/1976. Obtained by Fundação Getúlio Vargas. <https://digitalarchive.wilsoncenter.org/document/115212>

²⁶⁵ Estado de S.Paulo. 1956. "Reator Experimental para o Brasil" (20th April 1956).

Triangulating these data with documents and secondary sources, Table 6 depicts these events in a list. As reported in the Table 6, there were some examples of direct interferences from other countries than the United States – e.g., sanctions, refusal of sale. During some events, other countries avoided commercializing nuclear-related products to Brazil. This list represented actions that influenced negatively the development of local nuclear policy. In conclusion, this table 6 guides the reading of the next subsections about direct ways to pressure the Brazilian nuclear policy. I will summarize the content of the next subsections into this table and, then, detail these events during the next pages.

Table 6 – List of Direct Pressures that Affected the Brazilian Nuclear Program.

Year	Country	Event
1946	United States	Introduction of the 1946 Atomic Energy Act that prohibited the transference of technologies to other countries.
1947	United States	Washington pressured Brazil to grant it preferential access to local reserves of monazite sands.
1950s	Soviet Union	Moscow did not allow Brazil to host the IAEA's headquarter due to geopolitical concerns,
1954	United States	The United States blocked Brazilian acquisition of nuclear centrifuges from the Western Germany, which was under international tutelage from great powers. A decision endorsed previously by France and the United Kingdom.
1955	United States	Álvaro Alberto resigned from the top post at CPNq due to an arguably foreign interference.
1956	Soviet Union	Brazilian diplomacy hurried to set a diplomatic agreement to receive 20 ton of U ₂₃₅ from the United States. There were considerable pressures from Moscow and, in a minor scale, New Delhi.
1974	United States	The U.S. Navy pressured the Westinghouse not to help the development of thorium technologies in Brazil. Washington also hindered the negotiations of nuclear technologies for uranium enrichment.
1974	Multiple countries	The NSG ²⁶⁶ was established and reduced tightened the rules to negotiate sensitive technologies with countries outside the NPT.
1974	Japan	Tokyo did not conclude a cooperative ties with Brazil to develop nuclear uranium enrichment due to international pressure.

²⁶⁶ I will address the NSG more in-depth during the next chapter about India because this context revolves around 1974 nuclear explosion conducted by New Delhi. The NSG, roughly speaking, formalized the Zangger Trigger List (an informal previous initiative) to regulate the market of items related to atomic issues in the IAEA (INFCIRC/254). In this sense, the NSG worked as a global cartel to regulate the atomic-related market – in which, countries such as West Germany joined to adequate their rules to, at least, reduce the trade of sensible technologies (see Nunes 2021).

1974	France	Brazil fail to establish the negotiation of an enrichment factory because of the impossibility of technological transference.
1975	United Kingdom	British authorities declared that they would only transfer industrial capability to produce UF ₆ if Brazil accept global patterns of safeguard.
1974-1977	Netherland/ United States	Brazil was unable to access uranium enrichment technologies form Urenco as supposed due to the agreement signed with Western Germany. This agreement was put under IAEA safeguard system.
1976	France	France criticized the 1975 agreement between Brazil and Western Germany for not complying with NSG's guidelines. These countries acquiesced to these rules (INFCIRC/253) via a tripartite agreement with IAEA.
1978	United States	Washington required other countries to abide by nuclear full scope safeguards to maintain cooperative ties. This movement received endorsement from the United Kingdom and the Soviet Union. It reduced the trade of enriched uranium with Brazil and thereby limited the work of local research reactors.
1978	United States	President Geisel forbade cooperation with South Africa due to the United States' pressures against its nuclear projects – regardless the fact that South Africa developed studies to employ the uranium enrichment technique 'jet-nozzle'.
1979	Western Germany	Bonn pressured Brazil not to establish nuclear cooperative ties Iraq since it could involve technologies from the 1975 agreement with Western Germany.
1980s	United States/France	Great powers refused to sell compressors, supercomputers and mass spectrometer.
1980s	United States, United Kingdom, Western Germany	These three countries established communication mechanisms to avoid the circulation of useful equipment for the Brazilian nuclear program.
1980s	Soviet Union	Moscow demanded Brazil not to export the nuclear technology developed possible cooperative ties between the two countries.
1980	United States	Washington elaborated a trigger-list that reduced the exportation of nuclear materials.
1984	France	Paris imposed severe demands to supply Brazilian organizations machines to produce Uranium hexafluoride (UF ₆).
1985	Various countries	Brazil faced many challenges to import raw materials for the production of medical radioisotopes.
1986	Canada	National legislation blocked the sale of research reactors to Brazil.
1986	United States	Set new restriction to export nuclear materials for research reactors in Brazil.

1990	United States	Brazilian legislators assumed that Brazil had to abide by new nonproliferation mechanisms because Washington could condition its support for privatization programs to such a diplomatic movement.
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Source: own elaboration employing data²⁶⁷ from official documents and secondary literature

As observed in the Table 6, Brazil and the United States ties reached many impasses during the Cold War. Among Brazilians, a common suspicion that arises about the United States hinges over its ambitions sustain its regional hegemony since the Monroe Doctrine (1823) (see Teixeira 2012). Indeed, a respondent, during the interview, told that the lack of Soviet pressure against Brazilian nuclear policy occurred due to a sort of global division between great powers. Hence, such a struggle to consolidate Brazilian aspirations to become a great power sparked local debates about these mistrusts over foreign interference in national policies. As a DoS document about the Brazilian opinion about the Washington nuclear diplomacy revealed, a member from the military dictatorship claimed:

[...] We wanted to be a respected country; we wanted and we want to make our own reactors. And what do we see with distress? The Americans, our allies, are behaving in a way worse than that of our common enemies, the Russians²⁶⁸.

However, the next subsection will explore the growing number of direct ways employed against Brazil after the establishment of the NPT – including by traditional middle powers and other NWSs. For example, I came across an interesting article in a Brazilian newspaper from 1975 that claimed a diplomat from Brazil would have listened to a peer that it would be better to sign the NPT before the great powers enforced it since Washington and Moscow wanted to make Brasília abide by nonproliferation rules²⁶⁹.

This context reinforces the assumption that the nonproliferation regime spread an awareness against deviant cases and became a great powers' legitimized mechanism to apply instruments to reduce the contesting ambitions of emerging regional powers. This finding persisted during the Cold War and boosted great powers initiatives. Although Nixon's administration employed a more realistic/pragmatic foreign policy to approach some NPT defectors (see Patti and Spektor 2020), the United States did not renounce its diplomatic interest

²⁶⁷ Many of these pieces of information were previously displayed in the following document: Alvez, Rex Nazaré. 1987. Seminário: O Brasil e a Política Nuclear Internacional, consequências das restrições bilaterais e multilaterais no Programa Nuclear Brasileiro.

²⁶⁸ DoS. "US Embassy Cable, Brazilian Public Reaction to US Nuclear Policies," (19th November, 1976), History and Public Policy Program Digital Archive, National Archives and Records Administration (NARA), Record Group 59, Central Foreign Policy Files, created, 7/1/1973 - 12/31/1976. Obtained by Fundação Getúlio Vargas. <https://digitalarchive.wilsoncenter.org/document/115212>

²⁶⁹ Chabral, Arlette. 1975. "Silveira e Genscher assinam o acordo nuclear". *Jornal do Brasil*, 28th June 1975. In: CPDOC-FGV. Paulo Nogueira Batistas' archive.

to protect the nonproliferation regime. This context enabled the sophistication of mechanisms to regulate nuclear-related materials and technologies since India conducted a peaceful-aimed nuclear test in 1974 through the enrichment of uranium by imported technologies from Western countries such as Canada.

6.2.1 Direct Ways.

In this sense, I will describe the direct ways employed to make Brazil acquiesce to the nonproliferation rules. Indeed, the centrality of this subsection revolves around how the United States, the hemispheric power, attempted to curb Brazilian aspirations in the nuclear field. Yet, it is important to demonstrate how other agents and the IAEA pressured Brazil to assume a certain behavior. As readers will notice, this subsection is much longer than the Indian case – it is due to not only methodological decisions, but also Brazil coped with these direct mechanisms rather than New Delhi that challenged NWSs by conducting a nuclear test.

In the very beginning of the Brazilian nuclear history, many scientists, politicians and diplomats complained about the stiff opposition from the United States' monopolistic interests over nuclear technologies to the development of Brazilian autonomous atomic initiatives. According to their standpoint, Washington wanted to preserve a colonial hierarchy where it produced nuclear technologies buying raw material from states such as Brazil. Despite Washington get along with Brasilia to boost its national nuclear program and local enterprises profits, the White House was reticent when Brazil strengthened scientific ties with other countries (see Herzog 2021).

Since the WWII, the United States showed considerable interest in the Brazilian reserves of atomic material. Because of the belligerent times, Washington made diplomatic efforts to set new defensive²⁷⁰ ties with Latin American states over the supply of nuclear raw materials. Brazil, as a matter of solidarity, provided free access to the United States to the national reserves of monazite sands. Both countries reinforced these commitments through the signature of a trade agreement of nuclear materials during the 1945 Chapultepec Conference. Such a geopolitical dimension enabled the persuasion from the United States. Brazil, for example, ceded some radioactive raw materials to Washington, during the Korea War (1950-1953), as a

²⁷⁰ DoS. The Secretary of State to President Roosevelt (832.24/2691a). (8th January, 1944). In: Foreign Relations of the United States: Diplomatic Papers, 1944, the American Republics, Volume VII.

matter of endorsement. Indeed, the United States did not require Brazil to send troops to this war.

The United States explored nuclear materials from Canada and the erstwhile Belgium Congo. But, it attempted to assure a privileged instance over Brazilian reserves. The idea was stockpiling elements to produce nuclear energy without relying on a unique source. During the very beginning of the Cold War, many scientists from the United States set up researches to understand the possibilities of using thorium to extract uranium (U_{233}) (LAINETTI, 2015). After the Yalta Conference (1945), Roosevelt's administration hurried to reach Brazil's president Vargas to draft new agreements involving the supply of thorium (Camargo 2006). Official documents claimed this 1945 agreement to export a plethora of strategic minerals revolved around the following negotiation: Washington would pay about US\$ 40/ton. Brazil would provide a total of 100.000 tons of monazite sands during a time span of 10 years (SALLES, 1958). As table 7 demonstrated, Washington sustained a full-fledged cycle of mineral imports from Brazil during the Cold War's first years:

Table 7 – Brazilian sale (tons) of monazite sands to the United States

YEAR	AMOUNT (TON)
1945	1.031
1946	1.250
1947	2000
1948	1605
1949	2255
1950	1000
1951	1000

Own elaboration based on data extracted from Salles (1958).

Despite establishing a pro-United States foreign policy, Dutra's administration denounce this agreement, in 1946. Brazilian officials considered this agreement extremely harmful to the national interest²⁷¹. However, Brazil draw similar negotiations with the United States until 1955. The other three agreements granted preferential access to national mineral reserves to the United States. It provoked a myriad of critics from Brazilian nationalist sectors²⁷²

²⁷¹ Brazil. Senado Federal: Projeto de Resolução nº127, de 1982. In: FGV-CPDOC. Arquivo Paulo Nogueira Batista.

²⁷² United States. 1947. "Memorandum by Mr. Edmund A. Gullion to the Under Secretary of State (Acheson)". 3rd March 1947. In: Foreign Relations of the United States, 1947, General; The United Nations, Volume I. https://history.state.gov/historicaldocuments/frus1947v01/pg_799

since they wanted to employ these materials to set up an indigenous nuclear program. Likewise, they complained Washington paid abusive low values – the 1954 bilateral treaty conditioned the payment of minerals to dollars and wheat²⁷³. The United States, furthermore, prevented Brazil – via diplomatic means - to set trade deals with France over monazite sands and rare earth. It was observed in the following document about Washington’s opinion over the impact of new Brazilian partnerships to their 1945 agreement:

At same time you present note in above sense you may refer orally to reports that French or other interests are trying to make arrangements for delivery of monazite in the future and indicate in appropriate fashion that any commitments in this sense would, of course, be contrary to the agreement, while negotiations with such interests would seem to be inconsistent with its spirit²⁷⁴.

In the very beginning of the Cold War, the United States also exerted pressure against Brazilian national plans to consolidate a nuclear program via importation of European machinery. Firstly, Brazil recurred to European partners because the United States strived to sustain a nuclear monopoly via curbing cooperative ties and sales to other countries (SHERWIN, 1973). It interrupted any robust negotiation with Washington to look for similar assistance (Patti 2021). During the 1950s, Brazilian government attempted to follow a plan elaborated by Admiral Alvaro Alberto to find atomic assistance from Western countries. It was an initiative lauded by nationalist sectors as a first step to conduct national researches towards an atomic revolution.

It was seen by these agents as an opportunity to use natural resources to supply local demands and improve technological developments. In 1953, Alvaro Alberto reinforced a suggestion made by Robert Oppenheimer to enable the thermonuclear reactions in national soil via enrichment of uranium and extraction of plutonium (Patti 2021). During this period, the federal set national decrees to regulate the exports of uranium, beryllium, cadmium, lithium, and thorium²⁷⁵. During this period, Brazilian authorities were aware that great powers pressured Brazil to cede their reserves of materials that could insert this country into the nuclear order²⁷⁶. These minerals became strategic assets to encourage the flourishing of atomic-related

²⁷³ Estado de S.Paulo. O Brasil na era atômica. (3rd May, 1956).

²⁷⁴ DoS. Foreign Relations of the United States, 1947, vol. 1, General, The United Nations, doc. 433, <https://history.state.gov/historicaldocuments/frus1947v01/d433>

²⁷⁵ Brazil. Presidência da República. Casa Civil. 1951. ‘Decreto nº29.433’ (4th April 1951). [Dec29433impressao \(planalto.gov.br\)](https://www.planalto.gov.br/ccivil_03/decreto/1950-1969/Decreto29433.htm) (Checked in 18th August 2022).

²⁷⁶ Brajnikov, B. 1955. “Rapport nº1. à La Commission de L’Énergie Atomique du CNPq. Etude des Documents Concernant les Gisements Uraniferes du Plateau de Poços de Caldas (Minas Gerais et São Paulo). In: FGV-CPDOC. Arquivo Paulo Nogueira Batista.

industries. Although the government restricted the export of atomic minerals, diplomatic staff and some military officers still sustained the validity of preferential nuclear agreements with the United States via payments from the Lend-Lease Act and wheat grains (Patti 2021).

Indeed, the idea to establish a national nuclear program was acquire three centrifuges from the Western Germany which would also supplied training programs to Brazilian scientists. Also, Brazil would collaborate with Bonn via possible exports of raw material. Finally, Alberto's plans aimed to setting up an industrial-scale industry to refine local uranium. In this sense, Brazilian authorities initiated some talks with France scientific departments to establish a partnership (Patti 2021). Scholars and practitioners set scientific researchers to scrutinize Brazilian soil²⁷⁷. The French company *Société de Produits Chimiques des Terres Rares* would be responsible to establish a possible enrichment industry to work with uranium oxide (U₃O₈)²⁷⁸ – widely known as yellow cake.

The United States and the United Kingdom acted to hamper the development of this plan. Brazilian authorities attempted to conclude the acquisition of German equipment. However, Bonn did not enjoy full sovereign status at this moment and was under a sort of tutorship of great powers after WWII. Such sovereign-related context rested until the Paris Agreements, during the 1950s, which terminated this occupation and recognized both Germans as states. In so, Western Germany acceded to a NATO member in 1955, but previously it was not allowed to conduct these nuclear negotiations with Brazil²⁷⁹. In this sense, officials from the United States and the United Kingdom embargoed the shipment of these centrifuges in 1954. As official documents from the United States noticed, national policymakers feared Brazil obtained the knowhow to reproduce this technology²⁸⁰ and, consequently, trigger an action that went against Washington's nonproliferation interests. Bonn explained to the United

²⁷⁷ CNPq. 1953. "Carta do Professor L. Denivelle ao Almirante Álvaro Alberto". In: FGV-CPDOC. Arquivo Paulo Nogueira Batista (6th April 1953).

²⁷⁸ Conselho Nacional de Pesquisas. 1952. 'Société des Produits Chimiques des Terres Rares'. In: FGV-CPDOC. Paulo Nogueira Batista Archive. 1st July 1952.

²⁷⁹ United States. 1954. "Construction of Certain Scientific Research Equipment for the Brazilian Government". (24th November 1954). In: National Security Archive. See <https://nsarchive2.gwu.edu/nukevault/ebb518-the-gas-centrifuge-secret-origins-of-US-policy-of-nuclear-denial-1954-1960/doc%207%2012-2-54%20rg%2059%20central%20dec%20files%2050-54%20bx%205224.pdf>

²⁸⁰ United States. 1960. "Congress of the United States Joint Committee on Atomic Energy". (30th August, 1960). In: National Security Archive. See <https://nsarchive2.gwu.edu/nukevault/ebb518-the-gas-centrifuge-secret-origins-of-US-policy-of-nuclear-denial-1954-1960/doc%2023%208-30-60%20hearings%20%20JCAE.pdf>

States' diplomats that these machines would not allow Brasília to enrich considerable amount of U₂₃₅²⁸¹.

These gas centrifuges were sent to Brazil only three years after this episode and settled at the IPEN (erstwhile called IEA) (São Paulo). It disrupted the initial nationalist plan and triggered many complaints against foreign interference in technological policies. Nonetheless, it strengthened nuclear ties between Brazil and West Germany²⁸² through scientific and diplomatic missions and training of officials (Patti 2021).

This episode, indeed, was scrutinized in a first Brazilian parliamentary commission of inquiry in 1956 over the national nuclear program. This investigation was called initially to check the sale of mineral resources to other countries. However, it became part of deep political disputes between political parties. Under a high level of political disputes involving parties, the inquire concluded that General Juarez Távora was working to arguably protect the interests of the United States²⁸³ by making Washington aware about local plans and pressuring Alberto's resignation from the top post at CNPq – it happened in 1955 when the navy officer was charged with mismanagement of institutional budget. It served to reduce the political influence of Távora who advocated for the preferential partnership with the United States even to promote technological advances in Brazil (see Távora 1958).

During this legislative investigation, as we noticed, lawmakers analyzed four secret documents about this arguable foreign pressure and Washington's suggestions for Brazil to turn down initiatives of acquiring nuclear technologies from other countries such as West Germany. Nationalist sectors argued that utilitarian groups were too naïve to believe the United States would help the national development and thereby they were working against local interests over natural resources. Scientists, such as Marcelo Damy²⁸⁴ and José Leite Lopes, claimed that these utilitarian sectors were not taking into account the natural potential of Brazilian soil to provide solutions for local problems and the United States was not paying fairly for these materials (DE ANDRADE, 2006).

²⁸¹ United States. 1960. "United States-German Cooperation on Control of Ultra-Centrifuge Development" (13th June, 1960). In: National Security Archive. See <https://nsarchive2.gwu.edu/nukevault/ebb518-the-gas-centrifuge-secret-origins-of-US-policy-of-nuclear-denial-1954-1960/doc%2015%206-13-60%20hillenbrand%20memo.pdf>

²⁸² Brazil. 1969. "A Joint Communiqué about West German Minister Gerhard Stoltenberger's Visit to Brazil," March 28, 1969, History and Public Policy Program Digital Archive, National Archives of Brazil <https://digitalarchive.wilsoncenter.org/document/122308>

²⁸³ Estado de S.Paulo. 1956. 'Os Convênios Sobre Energia Nuclear Teriam Sido Firmados em Decorrência de Pressão Estrangeira' (2nd August 1956).

²⁸⁴ Damy, Marcelo. 'Nosso tório foi trocado por sobras de trigo'. Estado de S.Paulo. (2nd Septiembre 1979).

Yet, the Soviet Union also hampered Brazil in a reduced instance vis-à-vis Washington during the beginning of the Cold War. Moscow and Washington preferred to establish the permanent headquarters of the agency in Vienna – instead of Rio de Janeiro (FISCHER, 1997). Indeed, the Soviet Union did not allow Brazil to host the IAEA's headquarter. This great power did not consider Brazil a neutral country because it joined the Inter-American Treaty with the United States, so it preferred the establishment of the institution in Austria. For the same reasons, Moscow believed the transference of enriched uranium to Brazil from the United States bedeviled international efforts to control nuclear proliferation in the 1950s.

This sort of external pressure became more robust due to nonproliferation mechanisms entry into force – mainly the NPT. During the 1960s, Brazilian diplomatic documents already denounced pressure from great powers to make other states acquiesce to their positions on nuclear issues²⁸⁵. The establishment of some initiatives were considered just impositions from Washington and Moscow against other countries²⁸⁶. A diplomatic report called attention to the use of direct ways to pressure the Brazilian nuclear program, which could jeopardize the establishment of a robust plan via boycotts and refusal of sales²⁸⁷.

Direct ways of pressure gained momentum because Brazilian understandings were that the underpinnings of the nonproliferation regime disrespect its global image and diplomatic efforts²⁸⁸. Although Brazil acquiesced to initiatives to promote nuclear disarmament, it complained that some key elements of this regime encouraged countries to shun cooperative ties with Brazil for unfair reasons²⁸⁹. Likewise, these issues isolated Brazil with a few countries in diplomatic negotiations over the topic²⁹⁰. In so being, it became clearer that this sort of pressure was not exclusive to the United States. Other countries such as the Soviet Union and

²⁸⁵ Brazil. 1967. 'A Política Nacional de Energia Nuclear'. Brasília. In: Acervo da CNEN.

²⁸⁶ Brazil. 1968. 'Memorandum apresentado ao Senhor Ministro de Estado das Relações Exteriores pelo Embaixador J.A. de Araújo Castro. Chefe de Delegação do Brasil à Conferência do Desarmamento (período de sessões de 18 de janeiro a 14 de março de 1968) [Secreto]. In FGV-CPDOC. Arquivo Paulo Nogueira Batista. (21th Mars 1968).

²⁸⁷ Brazil. 1968. 'Memorandum apresentado ao Senhor Ministro de Estado das Relações Exteriores pelo Embaixador J.A. de Araújo Castro. Chefe de Delegação do Brasil à Conferência do Desarmamento (período de sessões de 18 de janeiro a 14 de março de 1968) [Secreto]. In FGV-CPDOC. Arquivo Paulo Nogueira Batista. (21th Mars 1968).

²⁸⁸ Ibidem.

²⁸⁹ Brazil. 1967. 'Estudos sobre aspectos de um Tratado de Não Proliferação de Armas Nucleares'. [Secret]. In: FGV-CPDOC. Arquivo Paulo Nogueira Batista. (24th February 1967).

²⁹⁰ Brazil. 1968. 'Instruções para a Delegação do Brasil'. [Secret]. In: FGV-CPDOC. Arquivo Paulo Nogueira Batista. (12th January 1968).

the United Kingdom²⁹¹ reinforced their commitments with the nonproliferation regime and exerted direct pressures against deviant cases.

The NPT enabled a new generation of direct pressures against Brazil. Beyond this treaty, the nuclear exports control became stricter after 1974 due to the establishment of the NSG as a reaction to the nuclear test in India. By trying to reduce loopholes in the nuclear market rules and export controls, this sort of cartel hardened the possibilities to find legal cooperative members in the nuclear field²⁹². Official documents claimed that Brazil feared possible mechanisms employed by great powers to prevent other countries to follow the Indian example²⁹³. Likewise, the United States investigated whether Brazilian policymakers would feel compelled to engage into an atomic test since India demonstrated that emerging regional powers could do so²⁹⁴. Indeed, I found a relevant telegram from the United States in 1974 (embassy in Buenos Aires) that demonstrate Washington alerted to avoid nuclear proliferation in Latin America (in this case, Argentina) – potential emulators of India²⁹⁵.

Even in 1974, some countries sent official communications to the IAEA claiming they would not establish nuclear commercial ties with other peers that did not acquiesce to the NPT without a specific safeguard agreement based upon IAEA rules – among them: Australia, Canada, Denmark, Finland, Norway, Netherland, West Germany, East Germany, the Soviet Union, and the United States²⁹⁶. In this sense, Brazilian diplomacy reported:

The superpowers will feel tempted to make the safeguard norms more rigid and to restrict their programs of nuclear cooperation, especially with non-signatories of the Treaty. It should be noted that the NPT was the highest point of the “détente”, when the Soviet Union demanded the commitment of non-nuclear armament by Germany in exchange for any collaboration with the West.

²⁹¹ Guerreiro, Ramiro Saraiva. 1980. “Informação para o senhor president da república” [Secreto]. In: FGV-CPDOC. Arquivo Ramiro Saraiva Guerreiro.

²⁹² Lopes, José Leite. 1982. “Common Supplier Policy on Comprehensive Safeguards”. In: FGV-CPDOC. Arquivo José Leite Lopes. XSee https://docvirt.com/docreader.net/DocReader.aspx?bib=JLL_e&pesq=%22Nuclear%20Suppliers%20Group%22&hf=www18.fgv.br&pagfis=2291

²⁹³ Brazil. 1980. ‘Comissão Parlamentar de Inquérito: Congresso Nacional (Resolução nº69/78)’. In: FGV-CPDOC. Arquivo Paulo Nogueira Batista (21th August 1980).

²⁹⁴ United States. 1974. “Brazilian Reaction to Indian Nuclear Testing”. In: National Archives. Central Foreign Policy Files, created 7/1/1973 - 12/31/1979, documenting the period ca. 1973 - 12/31/1979 - *Record Group 59*. See: <https://aad.archives.gov/aad/createpdf?rid=94382&dt=2474&dl=1345>

²⁹⁵ United States. 1974. “Argentine Nuclear Program”. 23rd September 1974. In: National Archive. A. BA A-167 (1973); B.BA-3971; C. STATE 135984; D. IAEA VIENNA 8015. In: <https://aad.archives.gov/aad/createpdf?rid=207930&dt=2474&dl=1345>

²⁹⁶ CBTN. 1975. ‘Novos Critérios na Aplicação das Salvaguardas da AIEA’. In: FGV-CPDOC. Arquivo Paulo Nogueira Batista (24th March 1975).

The Indian test will have immediate repercussions at the Conference of the Committee on Disarmament (CCD) headquartered in Geneva, of which Brazil is a member²⁹⁷.

During this period, Brazilian diplomatic agents and scientists tried to carve out partnerships France. Yet no cooperation in enrichment materials (Patti 2021). Similarly, France refused to establish an enrichment facility in Brazil via technological transference in 1974. In this episode, Brazilian authorities complained that French scientists decided not to provide mechanisms to enrich uranium through gaseous diffusion. Paris offered only reactors, which would be supplied by European sources²⁹⁸ – limiting Brazilian autonomy over this context. It reduced Brazil's interest to proceed with nuclear cooperation negotiations with France (see Nunes 2021). It is important to emphasize that some French companies could not establish partnerships involving technological transference because of contract restrictions imposed by the Westinghouse. In this sense, these companies, which produced nuclear-related mechanisms via a cooperation with the enterprise from United States, had to ask for a concession do to so during the 1970s (GIROTTI, 1984).

This context hit the development of the Brazilian nuclear program. It triggered the most reported event of foreign interference in the Brazilian nuclear project during the interviews. It revolved around the United States' actions, during 1970s, to obstruct the transfer of ultracentrifuges from the trilateral-led enterprise Urenco managed by a consortium between Germany, Netherland, and the United Kingdom²⁹⁹ (ALMEIDA, 2015). This company would be responsible to provide these technologies to Brazil due to a bilateral agreement with West Germany signed in 1975³⁰⁰. The agreement required that the provision of reactors to Brazil would be done by a German joint venture. This issue would boost the participation of German enterprises within the nuclear reactor's market and the realm of power plants constructions, which was dominated by companies from the great powers (BANDARRA, 2021; GRAY, 2012). In spite of this, Bonn called attention from Brazil because local nuclear companies mastered cutting-edge technologies in a fast pace – being a sort of role model³⁰¹. Likewise, it was the most important movement that the Brazilian military dictatorship made to move

²⁹⁷ "Report from the Brazilian Foreign Ministry to President Ernesto Geisel, 'Subject: The Indian nuclear test'," May 21, 1974, History and Public Policy Program Digital Archive, Brazilian Foreign Ministry Archives <https://digitalarchive.wilsoncenter.org/document/121350>

²⁹⁸ Nucleabrás. 1976. "Carta ao Senhor Ministro Dr. Shigeaki Ueki" (PNB 1952.07.01). (Secreto). In: FGV-CPDOC. Arquivo Paulo Nogueira Batista. (11th February 1976).

²⁹⁹ Visão. 1974. "Política Nuclear: Os projetos, as alternativas e o mistério". (9th September 1974).

³⁰⁰ Batista, Paulo Nogueira. 1976. "Nuclebrás: Carta PR- 182/76" [Secreto]. In: FGV-CPDOC. Arquivo Paulo Nogueira Batista. (16th August 1976).

³⁰¹ Frankfurter Allgeneire Zeitung. "Oito Usinas Atômicas Alemãs Planejadas para o Brasil" (2nd May 1975). [Document in Portuguese]. In: FGV-CDPOC. Arquivo Paulo Nogueira Batista.

towards an arguably robust nuclear program that could count with more the eight power plants – a controversial plan that I will detail in the next subsection (6.2.2). It is worthwhile to mention that this agreement was negotiated under secrecy to prevent other countries from creating diplomatic hurdles³⁰².

The Urenco's case was the most emblematic event of the use of direct ways against Brazil. Since Urenco's shares were divided into Germany, the Netherlands, and the United Kingdom, policymakers claimed the United States pressured Amsterdam (Salati 2022; Simbalista 2022) to hurdle this agreement (ALMEIDA, 2015) – as it was also vetoed by IAEA. Great powers – excluding China - complained about this agreement. Washington and Paris attempted to lure Bonn to reject any sort of technological transference to Brazil. Likewise, Moscow started to pressure West Germany not to establish such a robust nuclear cooperative tie with Brazil. In 1977, the Brazilian embassy in Bonn wrote in a telegram:

The Soviets now were expressing the same concerns: the Germans must distance themselves from compliance with their agreement with Brazil. Just like Washington, Moscow was criticizing not the supply of nuclear plants, but the export of facilities for the enrichment and reprocessing of fuel. The following week, Undersecretary of State Warren Christopher also showed up before Hermes on the same subject. The American repeated the urgent injunction from Carter to the effect that Bonn should not send to the South American country any factory for uranium enrichment nor any plant for the reprocessing of nuclear fuel³⁰³.

Indeed, domestic groups in Netherland reinforced the pressure against the use of local enterprises to supply enriched uranium to Brazil (Dalaqua 2017). Local political movements believed that Brazil could become a new nuclear menace due to its refusal to adhere to nonproliferation mechanisms such as the NPT. As demonstrated by Gray (2012, 461):

But important voices in the Dutch Social Democratic Party (PvdA) took umbrage at the sales to Brazil, arguing that no enriched fuel should be sent to a country that had refused to sign the NPT. Some on the Dutch Left went further, criticising their country's involvement in a major uranium-enrichment programme in the first place. It was no longer a question of whether nuclear exports promoted weapons proliferation; the use of nuclear power in Europe, with all its attendant environmental risks, had come under fire.

Urenco was not able to fulfill its obligations under the contract due to the refuse of Netherland. Germans, on their end, could only provide Brazil with the enrichment method so-called jet nozzle, which was under suspicion back then, due to its lack of scientific revision,

³⁰² Brazil. 1975. "Subsídios a Respeito do Acordo Brasil-Alemanha sobre Cooperação no Setor dos Usos Pacíficos da Energia Nuclear [Documento nº2]". In: FGV-CPDOC. Arquivo Paulo Nogueira Batista (June 1975).

³⁰³ Brazil. 1977. "Brazilian Embassy Cable, Brazilian Ambassador to Bonn Reports on Soviet Pressure on West Germany," March 21, 1977, History and Public Policy Program Digital Archive, Centro de Pesquisa e Documentação de História Contemporânea do Brasil (CPDOC), Fundação Getúlio Vargas (FGV), Azeredo da Silveira Archive, AAS mre pn 1974.08.15 pp. 589-591. Obtained and translated by Fundação Getúlio Vargas. <https://digitalarchive.wilsoncenter.org/document/115218>

and required substantial electric power to work (Silva 2022). During 1978, diplomatic bodies decided that Urenco would only provide low enriched uranium for Brazilian nuclear plants, but not transfer the technologies for nuclear enrichment. Furthermore, it caused another linked example that I will address in the next subsection about stigmatization. To protect the agreement with Germans, Brazil accepted to sign a very strict safeguard system based upon IAEA rules to block any sort of diversion of fissile materials (Wrobel 1992). Such an initiative to save the agreement received many criticism from nationalist sectors who claimed that the national government was accepting its submission to the nonproliferation regime (CAMERON, 2018). Some congresspeople complained these decisions to acquiesce to international pressures tacitly renounced the national independence over atomic issues (ALMEIDA, 2015).

In so being, the IAEA also pressures Brazilian partners to adopt safeguard mechanisms to establish nuclear cooperative ties with the country. Indeed, the safeguards imposed on the 1975 West Germany-Brazil nuclear treaty (INFCIRC/237) (1976) became a new sort of safeguard mechanism that opened new avenues to the establishment of the so-called full-scope safeguards (INFCIRC/405). Documents also demonstrate that the United States played a role in enforcing the need to set a specific safeguard agreement between Brazil, West Germany, and IAEA (see Almeida 2015).

These episodes demonstrated that NWSs and international agencies worked in tandem to frustrate the national ambition of developing an autonomous nuclear program. Brazil came across a controversial situation of being a non-NPT IAEA member. Prior to this episode involving the 1975 agreement, this country accepted to set nuclear-related bilateral ties with other partners (e.g., the United States and Germany) through agreements based upon INFIRC/66. That is, the IAEA supervised these cooperative mechanisms. Gradually, these international safeguard systems were enforced by great powers to establish a diplomatic supply of materials. To illustrate this affirmation, even Israel was required by the UNSC to place nuclear facilities under IAEA safeguard rules – in 1981 via SC/RES/487. In so being, Lima (1986) claimed Brazil attempted to enjoy the assistance provided by the IAEA without acquiescing to the NPT's more robust instance of nuclear control. Yet, this universalization of IAEA's safeguards started to upset Brazilian authorities – as illustrated in official documents claiming that these mechanisms were introduced in nuclear cooperative agreements to limit

local use of nuclear-related topics (e.g., the case of 1972 Brazil and the United States agreement)³⁰⁴.

This issue triggered a national debate in Brazil. Whereas some politicians assumed this safeguard agreement mediated by IAEA as a mechanism to diplomatically preserve the agreement³⁰⁵, nationalist sectors claimed that Brazil tacitly accepted international rules and granted Bonn control over the use of nuclear materials traded via the agreement. During the interview, a former decision-maker claimed the IAEA demanded this safeguard agreement to emphasize the civilian character of the cooperation. Hence, it establish rules that were too rigorous and enabled dubious interpretation of some aspects – e.g., if a radioisotope element were used in a military official, for medical procedures, could it be considered military-led purposes?

Brazilian media outlets demonstrated concerns about the use of IAEA mechanisms to hamper the development of the local nuclear program since unveiling any irregular activity could menace Brazilian image before the global public opinion³⁰⁶. Even a CNEN official document claimed supposed unfair use of IAEA safeguard system against Brazilian program was a possible source of concern such as diplomatic pressure from great powers and discrimination of international mechanisms in terms of technological and scientific cooperation³⁰⁷.

As Spektor (2016) claimed, these pressures to respect the safeguard system made Bonn restrict some possible transference of gas-centrifuge enrichment technologies that theoretically could be used for military purposes. This context hampered Brazil to overcome structural problems to enrich uranium – that is, producing UF₆. As Patti (2021, 143) observed, IAEA's mechanisms were also employed by great powers (e.g., the United States) to impose hurdles to countries that aimed to cooperate with Brazil in nuclear sales:

Washington refused to export machinery and materials useful for the gas centrifuge program even if the Brazilians stated that they would be used for other purposes. Washington pressured other NSG members, such as West Germany and the United Kingdom, to avoid allowing equipment useful for Brazil's unsafeguarded military-civilian nuclear activities to circulate. This was the case, for example, with a UF₆ mass spectrometer, a crucial tool for Brazil's nuclear program that was on the centrifuge trigger list (INFCIRC/209/Mod.2). Washington first refused to sell that equipment and then demanded a similar stance from

³⁰⁴ Brazil. Senado Federal. 'Projeto de Resolução nº127 de 1982' (Brasília: 1982).

³⁰⁵ Brasil. 'Segunda Parte Tel 869 Confidencial/Urgentíssimo'. In: FGV-CPDOC. Arquivo Paulo Nogueira Batista. (11th July 1979).

³⁰⁶ Estado de S.Paulo. 'Firmado em Viena o acordo de salvaguarda com a AIEA'. (27th February 1976).

³⁰⁷ CNEN. Departamento de Planejamento e Coordenação. 'Alternativas para a Formulação das Diretrizes de um Planejamento Nuclear Brasileiro'. Rio de Janeiro: 1974.

West Germany, where the firm Finnegan Mat GMBH was to export the item for the German-supplied enrichment plant, which was under international safeguards.

Direct ways rekindled in 1978 when the United States revamped unilateral strategies to avoid global nonproliferation. Indeed, Brazilian documents demonstrated the United States strengthened diplomatic efforts to convince Brazil to abide by the nonproliferation regimes³⁰⁸. Boycotts became a common source of external pressure to Brazil. Various countries avoided commercial ties with Brazil in nuclear terms. For instance, some countries preferred not to sell medical radioisotopes. That was the reason behind the Brazilian diplomatic attempt to avoid frontal disputes against great powers, despite all the grievances. It became a real issue for Brazilian policymakers when Carter's administration decided to impose the 1978 Nuclear Nonproliferation Act³⁰⁹ and required the establishment of CSA and the respect of NPT's and IAEA's norms to set nuclear trade agreements³¹⁰.

This international surveillance over the national nuclear program and the use of materials from the agreement with West Germany encouraged some national initiatives to overcome international restrictions. In fact, the negative consequences of safeguard systems spread an aware, observed in documents, that Brazil had to overcome this issue via secret projects to avoid direct restrictions and achieve the goal of establishing an autonomous program³¹¹. In this sense, military officers and some Brazilian scientists were upset about the obstacles imposed by these multilateral surveillance mechanisms to the transference of technology from Bonn. These Brazilian sectors believed establishing a secret project to learn how to enrich and produce reactors could provide than a sort of easy way to achieve national nuclear ambitions in a system ruled by restrictive rules:

The evolution of the international conjuncture led to the need of a commitment to obtain our own technology which, in the last analysis, is essential to the autonomy desired by any country. This effort, launched in the middle of the 1970's, was intensified in the beginning of the 1980's, to the extent that ever constraining restrictions were set forth in the sphere of international relations, both bilateral and multilateral. Such restrictions created all kinds of obstacles, at first of a technical nature, later presenting overt political motivations, with repercussions in the economic area. These obstacles not only put into doubt the free access

³⁰⁸ Paulo Nogueira Batista. 1977. "Secret Letter to the Minister Shigeaku Ueki" (PR-049/77). Brasília 8 February 1977. Obtained by Fundação Getúlio Vargas

³⁰⁹ I will address this topic again in chapter 7 because this act also triggered consequences to that state.

³¹⁰ Brazil. 1979. "Telegrama: Retransmite-se informação recebida da Embaixada do Brasil em Washington, em 18/06/1979". [Secreto]. In: CDPOC-FGV. Paulo Nogueira Batista's archive.

³¹¹ Carvalho, Norvásio G. 1977. 'Letter to the Minister Shigeaki Ueki' [Secret]. In: FGV-CPDOC. Arquivo Paulo Nogueira Batista. 9th September 1977.

to sensitive technologies, but also introduce unilateral changes *a posteriori* in the scope of existing agreements³¹².

Brazil set, in 1979, a secret nuclear program³¹³ to avoid IAEA surveillance, espionage, and foreign interference. This project was called “Parallel Program” and consolidated Navy as a fundamental institution for the Brazilian nuclear program since policymakers believed their plans to master nuclear technologies using ultracentrifuge methods and exploring the PWR technology (to employ in the nuclear submarine) were compatible with Brasília’s interests³¹⁴. It attempted to master nuclear enrichment techniques and allow local facilities and scientists to produce low-enriched uranium domestically. Such an initiative hinged on scientific and military efforts to conduct researches hidden from the IAEA safeguards in order to achieve the autonomous capacity to enrich uranium. As Spektor (2016, 642) pointed out:

Meanwhile, the Brazilian military devised plans to establish a separate program with the more limited goal of enriching uranium. The effort would be conducted free from international safeguards, under military supervision. In essence, the move was a response to external pressure: if Brazil was a target for an increasingly restrictive global nonproliferation regime, then technological “autonomy” became an even more valuable strategic asset.

Patti (2021) also claimed that Brazilian president João Figueiredo, at that moment, could choose between this autonomous initiative and a partnership between national companies (e.g., Nuclebrás) with other French counterparts – the so-called Integrated Project. However, as Patti (2021) demonstrated, the autonomous project would guarantee the mastering of nuclear technologies free from international safeguards and other diplomatic constraints. That is why Brasília chose this one instead of the Integrated Project. Brazil achieved the capacity to indigenously master nuclear technologies and the enrichment cycle of uranium through this secret program in 1987. In this sense, the IAEA and other diplomatic instances started to pressure Brazilian nuclear program to open its facilities to inspections – such as the Aramar Experimental Center in Iperó.

Indeed, Brazil maintained a critical standpoint about the influence of IAEA safeguards over the national nuclear program. To illustrate, Brazil refused to engage, during the 1980s, in Latin-American initiatives to establish nonproliferation rules because it feared great powers

³¹²Venturini, Danilo. 1985. "Guidelines for the Autonomous Brazilian Nuclear Program," February 11, 1985, History and Public Policy Program Digital Archive, Brazilian Foreign Ministry Archives <https://digitalarchive.wilsoncenter.org/document/121361>

³¹³ This secret program, like the nuclear agreement with West Germany, is a topic that I will address in the next subsection (6.2.2) since they were sources of stigmatization.

³¹⁴ Whereas the army delved into research about graphite-moderated natural uranium reactors and possible utilization of plutonium via analyses promoted by IME, the Air Force established a partnership with scientists from UNICAMP to explore a laser isotopic separation mechanism. It aimed to achieve a relevant scientific finding: developing a process to obtain heavy water through less expensive methods (Patti 2021). The Army project did not result in relevant gains and it was phased out during the 1990s.

would reinforce during RevCons that it would have to accept IAEA safeguard systems. But, in the meantime, the country promoted nonproliferation initiatives in the UN, such as ZPACS³¹⁵ in 1986. It established cooperative mechanisms for the maintenance of peace and security and cemented the path for the 1994 Declaration on the denuclearization of the South Atlantic³¹⁶ – against the interest of great powers such as France, the United Kingdom and the United States.

This subsection summarize the main direct ways employed against Brazil: (a) refusal of sale of sensitive nuclear technologies, (b) the use of multilateral instruments to pressure the Brazilian nuclear policy, (c) NWSs actions against potential nuclear partners of Brazil, and (d) the conditions imposed to make Brazil abide by nonproliferation rules. This was a long subsection, but I demonstrate that Brazil faced more direct than indirect sources of pressure since it did not opt to conduct nuclear tests (such as India). Stigmatization happened in a minor instance and indirect ways targeted the development of S&T policies in Brazil – by encouraging the dependence in imports than producing indigenously. I would emphasize my inference by demonstrating a Brazilian official document where ministers and the president Geisel, in 1978, assumed that it could be desirable to adhere the NPT because of the direct pressures against the national nuclear program via refusal of sale and lack of sensitive technologies caused by the NSG restrictions:

Regarding that possibility, several points were raised: a) President Geisel expressed doubt that what had been agreed at the Club of London would allow the FRG to sell the ultracentrifuge process to Brazil; b) the President of CNEN declared that the ultracentrifuge process is ideal for weapons purposes, but that the technology could be transferred to Brazil if we were to be considered a nuclear country by the Club of London; c) Minister Ueki pointed out the fact that Interatom, a German company, was a partner of Brazil and URENCO and that this could facilitate the obtaining of the ultracentrifuge technology; Minister Azeredo da Silveira recalled that in the case we would be able to obtain the ultracentrifuge technology, we might even sign the NPT in the case that this gesture became a decisive condition for obtaining the process. President Geisel agreed with this line and commented that we should make every effort to obtain a technology more developed than the “jet nozzle.”³¹⁷.

To reinforce this importance of direct ways in affecting the development of Brazilian nuclear policy, I will also cite this speech from the Brazilian representative in the IAEA Twenty-Ninth Regular Session (1985):

Brazil had made renewed efforts to implement its programme on the peaceful uses of nuclear energy despite the economic and financial constraints which had dramatically affected the level of investment, particularly in developing countries. It was true that those countries were bearing the

³¹⁵ A/RES/41/11.

³¹⁶ A/RES/49/26.

³¹⁷ Brazil. 1978. "Memorandum, Foreign Minister Azeredo da Silveira, Information for the President of Brazil, 'Nuclear Issues. Meeting at 13/02/78. Alvorada Palace.'", February 23, 1978, Wilson Center Digital Archive, CPDOC Archives, AAS mre d 1974.03.26 pp.12361-12366. Obtained and translated by Fundação Getúlio Vargas. <https://digitalarchive.wilsoncenter.org/document/116877>

brunt of the current malfunctioning of the world economy. The overall scarcity of financial resources had limited their various development programmes, including the nuclear ones. Brazil was no exception to the rule, but, despite its problems, remained convinced that the peaceful uses of nuclear energy were important not only for the future of its economy, but also for the well-being of its population³¹⁸.

6.2.2. Indirect Ways

The use of indirect ways to pressure Brazil occurred mainly due to three issues: (a) constraining Brazilian interests in advancing S&T indigenous projects by convincing policymakers to import technologies³¹⁹, (b) making this country abide by nonproliferation rules during the 1970s, and (c) reinforcing the hierarchical cleavages between the NWSs and other countries – e.g., disregarding Brazilian opinions over multilateral negotiations. I would claim that Brazil faced menaces of stigmatization. It did not cope with a full-fledged strategy to globally shame the country – like what happened with India after the 1974 nuclear test (see Chapter 7). In so being, readers will notice that Brazilian S&T programs were under constant indirect pressures: boycotts to Brazilian scientific centers and the refusal to accept Ph.D. students by foreign universities worked to pressure Brasília to acquiesce to international nonproliferation mechanisms. As I will point out, Brazilian universities faced hardships to maintain scholarly initiatives due to this issue.

Likewise, the Middle Power Trap works to convince agents that adherence to the international regime would provide benefits. Hence, I noticed that NWSs (notably the United States) and other countries tried to approach Brazil by demonstrating they could provide the necessary technologies to promote national development without the need to enhance the local nuclear industry via indigenous-led efforts. It reduces the incentives to fund indigenous scientific initiatives aimed at attaining nuclear autonomy while policymakers try to find shortcuts provided by industrialized countries.

Yet, these social constraints provoked defensive reactions from Brazil and affected the development of the national nuclear program – for example, Brazilian policymakers hurried to reduce tensions (e.g., explaining the country would not pursue the build of a reprocessing spent reactor fuel to obtain Pu₂₃₉). It occurred when the newspaper *Folha de S.Paulo* revealed that geologists were working in the Amazon rainforest to open a 600-foot-deep shaft that could be

³¹⁸ IAEA. 1985. “IAEA General Conference: Twenty-Ninth Regular Session: 23-27 September”. Vienna (24th September 1985). See https://www.iaea.org/sites/default/files/gc/gc29or-272_en.pdf

³¹⁹One caveat: this use of foreign assistance represents an indirect way because it hampered the development of scientific research as a whole – not only nuclear-related topic.

used to perform an underground test in 1984³²⁰. During the interviews with Carlo Patti and Ambassador Castro Neves, they emphasized an unofficial story that the Brazilian government would have refused the greatest possibility to set this nuclear explosion at the very end of the military government (1984-1985). President Figueiredo would have not accepted an offer from military sectors to conduct this experience, as a sort of a final accomplishment from the repressive military administration, to avoid negative external consequences (e.g., the strengthening of stigmatization campaigns against Brazil).

In this sense, this chapter focuses on the initiatives that tried to stigmatize Brazil and prevent this country from engaging in new partnerships with deviant cases. For instance, Brazilian policymakers avoided cooperating with some countries due to the concerns of assuming friendly ties with other deviant agents. In the Table 8, I summarize the historical events covered by this subsection to facilitate the reading. After that, I will describe the section 6.2.2.1. about stigmatization and diplomatic pressures against Brazil.

Table 8 – Indirect Ways against Brazilian Nuclear Program

Year	Country	Event
1950s	Great powers (mainly the United States)	Brazil established a diplomatic position to carve out a position inside the IAEA's board of governors and avoid intrusive safeguard instruments against the S&T programs from Third World countries.
1960s	United States, United Kingdom, Soviet Union	NWSs prepared the final draft of the NPT and claimed that members from the ENDC were creating unnecessary issues – like Brazil.
1970s	Various countries	Countries like Japan decided to avoid negotiating nuclear cooperation agreements with Brazil because of fearing diplomatic skirmishes.
1970s	NWSs	Great powers diplomatically attempted to convince Brazil to join the NPT.
1971	United States	Brazil acquired the Westinghouse PWR reactor and reduced drastically the funds to the Thorium Group, an initiative that mobilized other S&T sectors and promoted the internationalization of the UFMG.
1974	Various countries	Many countries subscribed to a document to the IAEA claiming they would not negotiate nuclear agreements without the respect of nonproliferation norms after the Indian nuclear test.

³²⁰ House, Richard. 1985. "Brazil Steps Back from Race to Build Nuclear Weapons". (28th August 1986) *The Washington Post*. <https://www.washingtonpost.com/archive/politics/1986/08/28/brazil-steps-back-from-race-to-build-nuclear-weapons/4fa5cc70-13f9-4957-a46d-e3ebeda46cd2/>

1975	United States and Soviet Union	Both great powers reprovred Brazilian initiative to work with West Germany in the nuclear field. Initial attempt to stigmatize Brazil.
1975	West Germany	Brazil signed the nuclear agreement with Bonn in order to attain nuclear autonomy by mastering the fuel cycle with ultracentrifuges. Yet, this agreement faced diplomatic pressure and reduced the capability to work without foreign interference. This initiative did not consult scientists and projects proved unfeasible – consuming the S&T national budget and producing negligible results to the local industry.
1977	United States	Cyrus Vance, the United States Secretary of State, declared that Washington could begin a diplomatic initiative to stigmatize Brazilian nuclear program.
1970s-1980s	Various countries	Brazil refused to cooperate with countries like South Africa due to diplomatic concerns.
1980s	IAEA and NWSs	Brazilian authorities are under investigation because of an S&T deal with Iraq to sell nuclear raw materials. It reinforce the image of Brazil as a deviant country.
1980s	United States	Boycott against Brazilian scientific organizations and refusal to host their PhD students.
1980s	IAEA and NWSs	Brazil and Argentina moved towards a diplomatic cooperative ties after having mastered key sensitive nuclear processes to produce fuel. It triggered the creation of the ABACC years later to avoid the intrusion of IAEA agents to enforce safeguard mechanisms since this issue would be carried out by regional workers from this initiative. It served to reduce diplomatic pressures against both countries.
1984	United States	Media outlets revealed that Brazil was arguably planning to conduct a nuclear explosion in a hole in the middle of the Amazon rainforest.
1987	MTCR	This instrument pressured Brazilian ballistic and space program in order to avoid possible negotiations with countries like Libya or the development of missiles.

Source: own elaboration

6.2.2.1. Stigmatization and diplomatic pressures.

It is important to bear in mind that Brazil has coped with the Cold War geopolitical logic where it was seems as a minor player within nonproliferation forums vis-à-vis the NWSs. For example, as I told previously, Brazil assumed a proactive diplomacy to protect national ambitions during the constitution of the IAEA in 1955. The local diplomacy engaged to demonstrate the national relevance over nuclear issues due to the fact of being one of the main reserves of thorium and uranium and its scientific development. The main concern was the

Article XXII of this document dealing with inspection over nuclear programs – an initial attempt to divide the world into two nuclear hierarchical groups (see Roehrich 2016).

Nonetheless, Brazilian officials reaffirmed their commitment to provide funds for the specialized agency and, in 1960, acquiesced to the initiative of adhering to a limited and transparent surveillance system³²¹. It was a meaningful aspect: Brazil – as observed in official documents - did not oppose the existence of an IAEA's safeguard mechanism since it did not hamper the development and the sovereignty of countries over their nuclear projects³²².

Also, Brazilian officials emphasized the existence of local programs to promote development of technologies employing thorium (FERNANDES, 2015). Such characteristics facilitated the legitimation of Brazil as a necessary member to these negotiations – a fact observed in the A/RES/810(IX). The ultimate aim was to join permanently the IAEA board of governors – responsible to set the institutional agenda and discussions. Likewise, Brazil³²³ agreed to India that this agency should foster economic development and provide technical support to the boost the use of nuclear energy in the Global South (Patti 2021). Both countries contested, in a certain level, the initial presence of many colonial powers – even Portugal was invited because of its exports of uranium oxide to the United States - in the mechanisms to discuss the IAEA's features and roles.

In this sense, Brazil handled a complicated question in the IAEA: carve out a prominent position since it detain considerable nuclear resources and sought to draw a robust nuclear program. In IAEA's history, Brazilian diplomacy achieved particular success. Brazilian authorities filled up initial institutional positions: Carlos Bernardes became the chairperson of the IAEA board of governors in 1959. Brazil, in this sense, convinced great powers that Brazil deserved to join the board of governors. Such an accomplishment was really celebrated because Brazilian authorities feared the absence of Third World countries in a decision-making organism.

As previous studies demonstrated, this context also reinforced nuclear cooperation between Brazil and Argentina since they found a *modus vivendi* within the IAEA (Patti 2021)

³²¹ Estado de S.Paulo. 1960. "Encerrou-se ontem em Viena a quarta Conferência da AIEA" (24th September, 1960).

³²² CNEN. Departamento de Planejamento e Coordenação. 'Alternativas para a Formulação das Diretrizes de um Planejamento Nuclear Brasileiro'. Rio de Janeiro: 1974.

³²³ Brasil. 1968. "Secretaria de Estado das Relações Exteriores: Telegrama da Delegação do Brasil em Genebra [Reservado]: Conferência de Estados Militarmente Não Nucleares (ONU/953(04))" In: FGV-CPDOC. Arquivo Paulo Nogueira Batista.

on sharing the principal decision-making roles for Latin America. Both countries were able to manage their divergences during the very beginning of the IAEA. Although their initial disputes to define who was designed the Latin American most advanced nuclear state, Brazil and Argentina accepted to share this status. It is worthwhile to mention that nationalist movements complained about this consensus by claiming it ceded some of national nuclear ambitions to international interests. This was due to the necessity to recognize Buenos Aires as a similar well developed nuclear power who could have other geopolitical ambitions – differently from Brazil (CAMARGO, 2006).

Brazil assumed a cautious diplomacy to safeguard interests in a context dominated by the great powers' understandings. As Patti (2021) observed, the Latin American state reduced gradually the interests over this agency due to the influence of Cold War's dispute that hamper new debates over atomic energy. Indeed, the interviews demonstrate that Brazil started to face some issues with the IAEA due to the NPT. For instance, Brazilian authorities complained that IAEA developed different safeguard systems according the global nuclear status of countries. Whereas great powers claimed to respect the NPT via VOA, other countries would face robust mechanisms of surveillance. Although Brazilian institutions always emphasized the relevance of IAEA cooperative ties to promote technological partnerships with local institutions, it started to take into consideration great powers' pressures to make European countries abide by the agency's rules after the creation of Euratom (1958) (see De Andrade 2006).

Thus, I will start by emphasizing the moments that Brazil coped with the menace of stigmatization. The NPT's entry into force played a considerable role in the stigmatization of the Brazilian nuclear program. Interviewing a former policymaker from Brazil (not recorded answer), he attested that Washington attempted to curb its strategies in nuclear multilateral negotiations. For example, a parliamentary committee of inquiry in 1990 interviewed the Brazilian General Danilo Venturini who claimed this treaty represented a division of the world that relegated the country to a technological dependence without taking into account the national interests³²⁴. Likewise, Washington denounced that Brazilian diplomacy worked, during the negotiation of the NPT, with proselytism and menaced to thorn apart global initiatives to preserve world peace – a clear try to stigmatize Brazil before its peers³²⁵ and

³²⁴ Brasil 1990. “Relatório no 13, DF 1990. Comissão Mista de Inquérito destinada a apurar o programa autônomo de energia nuclear, também conhecido como “programa paralelo”. Relatório Final. Relator: Senador Severo Gomes, 1990”.

³²⁵ Brazil. 1968. ‘Memorandum apresentado ao Senhor Ministro de Estado das Relações Exteriores pelo Embaixador J.A. de Araújo Castro, Chefe de Delegação do Brasil à Conferência do Desarmamento (período de

emphasize the difference between NWSs and other countries. In this sense, these elements confirmed the results observed in the chapter 5.

The two most evident initiatives to stigmatize the Brazilian nuclear program were: (a) the visit of the United States Secretary of State Cyrus Vance in 1977, and (b) the criticism of Brazilian nuclear cooperation with countries such as Iraq or South Africa. The first case happened to discuss Brazil's idea to advance in the nuclear field via the 1975 agreement with West Germany. The aim was to discourage Brasília from assuming an incisive policy towards nuclear autonomy without complying with IAEA's safeguard system and nonproliferation rules. This visit reinforced Carter's administration traditional position to pressure emerging regional powers in the nuclear realm³²⁶. Brazilian authorities had access to a secret document from Vance's staff. It claimed the United States would strength efforts to stigmatize the Brazilian nuclear program, including, throughout the national society:

They professedly take the focus out of confrontation and claim for common sense, "convincing" diplomatic capabilities, and technological "realities" by feeding information to the Brazilian public opinion about the cons of adopting the technology we have chosen and by proposing alternatives to the Brazilian nuclear program, in order to weaken it³²⁷.

The second case revolves around this initiative from the NWSs and international agencies started a campaign to make Brazil abide by rules. Brazilian contesting positions against the NPT provoked reticence reaction from other countries. For instance, Japanese officials refused to keep up with nuclear negotiations with Brazil on uranium mining projects and the build of plant to produce UF₆. They claimed that Tokyo was not interested to compromise commitments with the United States to avoid sharing with countries results over uranium enrichment obtained through research³²⁸. Despite the lobby of Japanese companies (e.g., Mitsubishi), Tokyo reaffirmed that its nuclear deals involved the respect of IAEA safeguards³²⁹. In this sense, the fear to engage with a possible source of stigmatization prevent other countries from assuming friendly commitments with Brazil.

sessões de 18 de janeiro a 14 de março de 1968). In: FGV-CPDOC. Arquivo Paulo Nogueira Batista (21 de março de 1960).

³²⁶ Brazil. Ministério das Relações Exteriores. 1977. "Informação para o Senhor Presidente da República" [segredo]. 30th November 1977.

³²⁷ Brazil. 1977. "Ministry of Foreign Affairs Information to the President, 'Secretary of State Cyrus Vance's Visit'," November 30, 1977, History and Public Policy Program Digital Archive, Ernesto Geisel Archive/CPDOC. Critical Oral History Conference on the Argentine-Brazilian Nuclear Cooperation, Rio de Janeiro, March 2012. <https://digitalarchive.wilsoncenter.org/document/123287>

³²⁸ Brazil. 1973. 'Energia Nuclear – Cooperação Brasil-Japão'. In: FGV-CPDOC. Arquivo Paulo Nogueira Batista (18th May 1973).

³²⁹ Brazil. 1973. 'Energia Nuclear – Cooperação Brasil-Japão'. In: FGV-CPDOC. Arquivo Paulo Nogueira Batista (18th May 1973).

It became worse after Brazil started to demonstrate an interest in negotiating nuclear technologies with agents outside the NPT – such as India. Although Brazil signed in 1969³³⁰ a cooperative nuclear agreement with New Delhi, it did not want to renew this initiative. Some local authorities assumed strengthening ties with India would be beneficial for the S&T development³³¹, but it did not occur. I cannot affirm that Brazil moved away from cooperating with India in nuclear technologies due to 1974. Yet, Brazilian authorities did not look to continuing these ties during the Cold War – following a path observed in other countries where Brasília declared fear of stigmatization and I will address during the following pages. It is worthwhile to mention a United States diplomatic telegram about talks with Brazilian diplomats who confirmed this “avoiding-risks” position adopted by Brasília, for example in dealing with 1970s proposals for the denuclearization of South Asia, in which the Latin American countries argued it was a regional matter³³².

Meanwhile, Brazilian policymakers decided to pursue the nuclear agreement with West Germany and find solutions for obtaining the mastering of nuclear fuel cycle. These elements severed indirect pressures against Brasília. During the 1970s, Brazil tried to diversify the nuclear partners due to the secret program. It faced many challenges. Documents demonstrated that the Soviet Union considered Brazilian nuclear interests are a real concern to the nonproliferation regime³³³. Such a spread of critics against the Brazilian nuclear program showed that other countries reduced their interest in fully engaging in atomic partnerships with heavy critics of the NPT³³⁴. Washington disapproved this Brazilian-West German initiative to cooperative in the nuclear realm and even tried to offer Brasília alternative plans (using thorium as the analyzed element³³⁵) to reduce the interest over initiatives with Bonn – attested by a document that depicted a discussion between Brazilian policymakers over this topic:

³³⁰ Brazil. CNEN. 1974. “A Energia Nuclear na Índia”. 1/A/03. In: Arquivo da CNEN.

³³¹ Brazil. 1978. “Energia Nuclear Cooperação Indo-Brasileira [Telegrama Secreto]. In: FGV-CPDOC. Arquivo Azeredo da Silveira.

³³² United States. “29th UNGA: U.S. Bilateral Consultation”. [Confidential]. Central Foreign Policy Files, created 7/1/1973 - 12/31/1979, documenting the period ca. 1973 - 12/31/1979 - *Record Group 59*. <https://aad.archives.gov/aad/createpdf?rid=196790&dt=2474&dl=1345>

³³³ United States. Foreign Relations of the United States, 1964-1968, Volume XI, Arms Control and Disarmament. 1968. ‘Memorandum of Conversation’. In: ed. Evans Gerakas, David S. Patterson, and Carolyn B. Yee (Washington, DC: GPO, 1979), doc. 289

³³⁴ Brazil. 1977. ‘Relatório sobre o Projeto Cobra’. In: FGV-CPDOC. Arquivo Paulo Nogueira Batista. (14th December 1977).

³³⁵ I cannot attest that the White House sought to strengthen even the control of Brazilian possibilities to use thorium as a fertile nuclear source. However, the United States presented an interesting document to Brazilian policymakers in 1977. The United States proposed cooperation on thorium-based fuel cycle via a quadripartite alliance with France and Switzerland. The fact is that Brazilian authorities did not accept this negotiation due to the feat of increasing dependence on the United States and the commitments with Bonn. See: Brazil. 1977. “Brasil-

Finally, the Vance proposal regarding the thorium cycle was discussed. Once again it became clear the difference of views between the President of CNEN (favorable to thorium and champion of the thesis that Brazil has enormous reserves of this metal) and NUCLEBRÁS (more skeptical about Brazilian reserves). Minister Nogueira Batista expressed his opinion against Brazilian participation in the quadripartite agreement (FRG, USA, France and Switzerland) on high temperature reactors, believing that any cooperation with the USA in the nuclear field would have negative repercussions, since it would certainly give the impression that we were embarking on an alternative to the Brazilian Nuclear Program. Professor Gervásio said that the United States was willing to return to cooperating with Brazil in the nuclear field and that FRG-USA cooperation in the field of thorium was more formal than real³³⁶.

Although some states sustained critical perspectives about the nonproliferation regime, it became harder to set cooperative ties around sensitive atomic-related technologies³³⁷. A clear example of this assertive was the case involving South Africa cooperation to master a German-born uranium enrichment technique so-called jet-nozzle during 1970s and 1980s. Brazil refused to strength any nuclear tie with Pretoria (see Patti 2018) even if this country could teach national scientists to operate the jet-nozzle via South African improvements – called helikon-vortex (Castro Neves 2022; Simbalista 2022). Brazil took measures to avoid diplomatic pressures³³⁸. It was due to the increase global diplomatic campaign against the apartheid and its nuclear program, which conducted secret tested in 1977.

Documents attested that Brazil was not keen on challenging the social understanding that South Africa should be isolated³³⁹. Also, Brazil employed diplomatic efforts to control possible damages to its nuclear program because of the pressure against South Africa³⁴⁰. Similarly, Brazil assumed a cautious position to meet Pakistani authorities in a possible negotiation over nuclear matters in 1982 (Patti 2021). This reticent approach to nuclear diplomatic partnerships with countries that demanded technical assistance or transference of

EUA: Questões Nucleares, Propostas Apresentadas pelo Secretário de Estado Cyrus Vance: Suspensão do Reprocessamento e Desenvolvimento do Ciclo do Tório”. In: FGV –CPDOC. Arquivo Antônio Azeredo da Silveira. It is worthwhile to notice that President Carter insisted that the United States could offer cutting-edge technologies to reinforce the capacity of Brazil explore the thorium cycle. See: Brazil. 1978. “Terceira Reunião – Brasília, 30 de Março de 1978 – Palácio do Planalto”. In: FGV-CPDOC. Arquivo Antônio Azeredo da Silveira. I found a crucial document demonstrating that Brasília feared that any cooperation with the United States in the thorium cycle would reduce the national autonomy with this material since sensitive technologies would not be transferred (See: “Brazil. 1977. “Informação para o Senhor Presidente da República” (25th November 1977) [Secreto]. In: FGV-CPDOC. Arquivo Antônio Azeredo da Silveira).

³³⁶ Brazil 1978. ““Memorandum, Foreign Minister Azeredo da Silveira, Information for the President of Brazil, Nuclear Issues. Meeting at 13/02/78. Alvorada Palace.”, February 23, 1978, Wilson Center Digital Archive, CPDOC Archives, AAS mre d 1974.03.26 pp.12361-12366. Obtained and translated by Fundação Getúlio Vargas. <https://digitalarchive.wilsoncenter.org/document/116877>

³³⁷ Nuclebras.1978. ‘Informação para o Senhor Ministro das Minas e Energia’. In: FGV-CPDOC. Arquivo Paulo Nogueira Batista. (27th March 1978).

³³⁸ Brazil. 1976. “Regatas Capetown-Rio” [Secreto].In: FGV-CPDOC. Arquivo Ernesto Geisel.

³³⁹ Brazil. 1977. “Política Externa Brasileira: Características Gerais e Alguns Aspectos Regionais”. In: FGV-CPDOC. Arquivo Ernesto Geisel (18th November 1977).

³⁴⁰ Ministério das Relações Exteriores. 1987. “Brasil-Argentina. Cooperação Nuclear. V Reunião do Grupo de Trabalho de Política Nuclear. Telegrama NR.15.521”. [Secret]. In: FGV-CPDOC. Arquivo Paulo Nogueira Batista (24th August 1987).

technologies (e.g., Chile, Uruguay, and Libya³⁴¹) due to worries about how they could compromised the Brazilian nuclear program³⁴².

Indeed, other initiatives sparked huge controversies: for example, when Brazil sold dioxide of uranium (UO₂) – produced by the IPEN - to Iraq during the 1980s (MALHEIROS, 1996). As Malheiros (2018) pointed out, international mechanisms of nuclear surveillance targeted the possible relations between the Brazilian nuclear program and Iraq's regime after the Gulf War (1990-1991) – claiming Brazil possibly furnished these materials to Baghdad after exchanging monazite sands for raw materials to produce the UO₂ with countries like Portugal and Belgium.

IAEA questioned Brasília for engaging with Baghdad in the transference of nuclear material. Iraq became a main source of crude oil to Brazil and a major customer of Brazilian manufactured products during this period³⁴³. It reinforced concerns about Brazilian nuclear program and its ambitions – making the local policymaking actors study how this partnership could harm national atomic interests³⁴⁴. On this topic, I will address lastly the case of Brazilian cooperation with China (a NWS) during the 1984, in which Beijing offered nuclear sensitive materials and enriched uranium for Brazil while negotiating the compliance with nonproliferation rules. This agreement is not a problem for the Middle Power Trap's logic since it was not fruitful and prompted a decisive reaction from the United States and West Germany (see Patti 2021).

During the Cold War's very end, there were established other mechanisms to promote international disarmament. The MTCR, created in 1987 and supported by the G7, defined some mechanisms to regulate the trade of materials and technologies employed to produce missiles. It is worthwhile to mention that the MTCR does not have a coordinating body and worked to restrict market via multilateral pressure and, thereby, stigmatize some countries as potential

³⁴¹ Brazil. 1979. "Aviso no. 025/79, Response from Minister Antonio Francisco Azeredo da Silveira and General Gustavo Rego Reis", January 30, 1979, Wilson Center Digital Archive, CPDOC Archives, PNB pn a 1978.07.13 pp. 28-32. Obtained and translated by Fundação Getúlio Vargas. <https://digitalarchive.wilsoncenter.org/document/116868>

³⁴² Nedal, Dani. 2023. "Brazil-Iraq Nuclear Cooperation". *Wilson Center*. See <https://www.wilsoncenter.org/publication/brazil-iraq-nuclear-cooperation>

³⁴³ Brazil. 1976. "Memorandum for the President, 'Commercial Relations of Brazil with Petroleum Producing Countries'", July 7, 1976, Wilson Center Digital Archive, CPDOC Archives, AAS mre d 1974.03.26 p.7336. Obtained and translated by Fundação Getúlio Vargas. <https://digitalarchive.wilsoncenter.org/document/116866>

³⁴⁴ Brazil. 1979. "Memoraandum, Minister Saraiva Guerreiro, Information for the President, "Nuclear Cooperation. Brazil-Iraq", September 19, 1979, Wilson Center Digital Archive, Obtained and translated by Fundação Getúlio Vargas. <https://digitalarchive.wilsoncenter.org/document/116869>

menaces to global peace. The problem, like the NPT, is that it operates in an unequal logic of power where great powers played the role of decision-makers. In this sense, Tollefson (1990, 6) claimed, this multilateral pressure worked to limited Brazilian missile program:

The MTCR has achieved its more limited goal of delaying missile proliferation among developing countries. By restricting missile-related technology, the MTCR has succeeded in increasing the time and costs associated with the development of ballistic missiles. In Brazil, military officers have openly complained that their space programs have been hampered by the MTCR restrictions. According to one report, "the Brazilian authorities responsible for the Brazilian Complete Space Mission have now become persuaded that it is not possible, at least in the short term, to count on arranging the transfer of the most modern foreign technology for the development of a medium-range missile³⁴⁵.

In fact, the Brazilian national ballistic concerned great powers. It became another source of multilateral pressure against a Brazilian project. This initiative started in 1979, aimed to design some satellites to send earth orbit in a site in Alcântara (Maranhão) (Spektor 2016). Although it initially received supported from the United States, the development of the Sonda series of sounding rockets raised suspicion (BOWEN, 1996). Yet, some interviews, conducted by this research, demonstrated that there was an international concern that it could be diverted to produce missiles to carry nuclear weapons. The problem was the hypothesis that Brazil accepted any support from countries like Libya or strengthened cooperative ties with Iraq. The latter bought some Brazilian weapons, produced by a national enterprise Avibras - called Astros during the war against Iran (1980-1988) (Guimarães 2016). Such a regime, for example, worked to refrain the sale of French missile technologies to Brazil. In these cooperative relations, NATO countries (excluding Iceland) reduced the interests to transfer technological instruments to Brazil (Patti 2021).

As a last example, I would detail the creation of the regional initiative ABACC. Under heavy international pressure, Brazil and Argentina established the ABACC (1991) and bilateral agreements about the use of energy-related elements. Both countries attempted to consolidate atomic programs without complying with nonproliferation rules. The establishment of the ABACC aimed to reinforce the peaceful aims of their nuclear programs and assimilate IAEA safeguard mechanisms without the interference of foreign agents. Commitments with safeguards would be carried out and checked by local South American workers and practitioners. During the 1980s, Brazilian and Argentinian authorities made the first movement to reduce tensions with IAEA. For example, critics from the NWSs made both states realize that they arguably needed to acquiesce to some regulations after the 1985 RevCon – the creation

³⁴⁵ Tollefson, Scott D. 1990. "Brazil, the United States, and the Missile Technology Control Regime" In: United States Navy Postgraduate School Research Council.

of a bilateral group to propose nuclear collaboration. It consolidated the plan of Carlos Menem and Fernando Collor de Mello to set a bilateral safeguard system that adjusted the regional context to the norms of the nonproliferation regime (Patti 2021).

6.2.2.2. Convincing Brazil to renounce S&T projects by offering foreign assistance.

These topics presented relevant elements that attested to the use of indirect ways to pressure the Brazilian nuclear program. However, I consider the initiatives to convince Brazil to renounce the S&T ambitions to promote local development and acquire foreign assistance, reinforcing the technological dependence, the most important case to be analyzed. I will stress two events that describe an element proposed by the Middle Power Trap: great powers use nonproliferation instruments to preserve their exclusive status and the gap between industrialized countries and emerging regional powers. In this sense, I focus on the case of the Thorium Group, an academic group formed by UFMG scientists during the 1960s to make Brazil attain nuclear autonomy, and the 1975 Brazilian-West Germany nuclear agreement. Hence, I will emphasize the use of international assistance in favor of the Middle Power Trap by the great powers.

International assistance, as aforementioned, facilitated the development of the Brazilian nuclear program. Cooperative ties with foreign institutions provided both instrumental and intellectual assets to consolidate the local scientific community. It would be unfair to claim foreign aid has not played a positive role in the existence of Brazilian atomic-related initiatives. Science relies on an exchange of knowledge. Such scholarly ties with foreign agencies and universities, for example, were crucial to awakening Brazil's nuclear ambitions and enabling national scientists to master uranium enrichment technologies. Foreign private funding organizations (e.g., Rockefeller Foundation), for example, provided funds to the establishment of the UFPE's academic nuclear research center³⁴⁶.

Nonetheless, international initiatives can damage indigenous-led plans. The existing literature usually addresses sanctions and diplomatic pressures as mechanisms to constrain nuclear ambitions. Yet Brazilian official documents call attention to the possible use of promises of assistance and technological sales to force the abandonment by the national government of its nuclear ambitions. In a 1977 secret memo about possible Brazilian reactions

³⁴⁶ CNEN. 1966. 'Relatório Anual'. In: Arquivo da CNEN.

to foreign approaches to hamper the national nuclear project, Foreign Minister Azeredo da Silveira claimed Brazil had to analyze any offer of assistance from the United States³⁴⁷. It was important to observe, according to the minister, whether the conditions to accept these offers would not hamper the indigenous S&T development.

During the research, an interesting finding was these debates about the role played by foreign assistances to the nuclear program. As demonstrated, Brazilian decision-makers were divided into nationalists and utilitarians who naturally endorsed international assistance. However, the formers denounced international pressures, and the fear of stigmatization encouraged the national administration to accept many kinds of foreign assistance that reduced the interest in local initiatives. In this context, documents stressed relevant debates about the possible consequences of the acquirement of cutting-edge technologies from great powers instead of endorsing indigenous programs³⁴⁸. Furthermore, the preference given to external assistance was considered a mechanism to preserve Brazilian dependency on foreign suppliers and thereby facilitate its acceptance of international rules.

As aforementioned, Brazilian officials have, since the 1950s, tried to set up an indigenous nuclear program. Scientific and political agencies have always discussed the role played by external assistance. Despite nationalist sectors recognizing the relevance of receiving foreign aid, they emphasized the need to set partnerships to transfer technology to Brazil. For instance, a historical nationalist leader was navy captain Álvaro Alberto who recommended to the Brazilian administration, during the 1940s and 1950s, to institute a policy of “specific compensations”. This meant that Brazil would only sell atomic raw materials if industrialized countries paid with technologies and knowledge to develop national enrichment mechanisms such as a reactor. It would also foment the newly born atomic-related industries, during the 1950s, via private initiative and governmental support – e.g., the incentives from the regional government of Minas Gerais to the establishment of a nuclear industrial zone in Poços de Caldas

³⁴⁷ Silveira, Antonio Francisco Azeredo da. 1977. "Memorandum from Brazilian Foreign Minister Silveira to President Geisel, US Threats and Promises and Brazilian Responses," February 25, 1977, History and Public Policy Program Digital Archive, Centro de Pesquisa e Documentação de História Contemporânea do Brasil (CPDOC), Fundação Getúlio Vargas (FGV), Azeredo da Silveira Archive, AAS mre pn 1974.08.15 pp.544-549. Obtained and translated by Fundação Getúlio Vargas. <https://digitalarchive.wilsoncenter.org/document/115220>

³⁴⁸ Brazil. 1968. 'Memorandum apresentado ao Senhor Ministro de Estado das Relações Exteriores pelo Embaixador J.A. de Araújo Castro, Chefe de Delegação do Brasil à Conferência do Desarmamento (período de sessões de 18 de janeiro a 14 de março de 1968). In: FGV-CPDOC. Arquivo Paulo Nogueira Batista (21 de março de 1960).

(CAMARGO, 2006). It is worthwhile to mention that, in 1953, the UFMG settled the first exclusive Brazilian nuclear research center – so-called IPR³⁴⁹.

The creation of the CNEN in 1956 was a robust nationalistic initiative to coordinate Brazilian nuclear policy through the development of cutting-edge technologies to master atomic-related scientific processes – directly subordinated to the President of the Republic. The CNEN created channels of communication between political policymakers and scientists and military officers. In so being, initial reports from the CNEN³⁵⁰ meeting noticed the agency's interest to consolidate national plans to produce indigenously reactors. Similarly, some documents also attested that CNEN worked in tandem with other scientists to consider different enrichment technologies – for example, these agents were keen on learning more about natural uranium reactors used by France³⁵¹ and India (Patti 2021).

Such a scientific debate about which sort of technology Brazilian policymakers should endorse mobilized a considerable amount of resources. Yet it allowed the multiplication of national projects and encouraged the establishment of scholarship programs to send researchers abroad to analyze nuclear technological developments. For example, Brazilian legislators established exchange programs funded by the national government for nuclear studies, geology, and mining-related engineering in 1956 via decree 1.918³⁵².

CNEN documents presented initial criticism from scientists that Brazilian nuclear program was not developing in a rapid pace. Other countries were overcoming some structural problems to set up atomic-related studies, but Brazilian authorities did not present, during the 1950s, a consolidated long-range program to use atomic energy and build nuclear plants. It is worthwhile to notice that, even though CNEN documents criticized this lack of a robust nuclear plan, this agency refused to work with previous initiatives elaborated by Álvaro Alberto.

³⁴⁹ CNEN. Departamento de Planejamento e Coordenação. 1974. 'Alternativas para a Formulação das Diretrizes de um Planejamento Nuclear Brasileiro'. In: Arquivo da CNEN.

³⁵⁰ CNEN. 1957. 'Ata da Décima quinta (15ª) Sessão da Comissão Nacional de Energia Nuclear realizada aos vinte (20) dias do mês de fevereiro de mil novecentos cinquenta e sete (1957)'. In: Biblioteca Digital Memória da CNEN. (20th February 1957).

³⁵¹ CNEN. 1958. 'Ata da trigésima primeira (31ª) sessão da Comissão Nacional de Energia Nuclear realizada em três (3) de janeiro de mil novecentos e cinquenta e oito (1958)'. Biblioteca Digital Memória da CNEN. (3rd January 1958).

³⁵² Brazil. Câmara dos Deputados. "Decreto 1918 – 1956". In: Congresso Nacional. Câmara dos Deputados. Diretoria de Documentação e Informação. 1963. *Energia Nuclear (Legislação)*. Vol.iii. (Brasília: Brasil).

National authorities started to reframe Brazilian nuclear plans to provide energetic solutions to foster industrialization³⁵³ and catch up with scientific development observed in great powers.

During this period, the United States launched the program Atoms for Peace. Debates about the role of this Washington's diplomatic strategy played within the Brazilian nuclear policy during the 1950s. The Atoms for Peace rapidly obtained success of setting cooperative ties with traditional Western partners³⁵⁴ of the United States. Some of these countries, in this sense, received preferential treatment. It improved the United States image as a nuclear ally and stimulated the implementation of student exchange programs and technological trade (see Mateos and Suárez-Díaz 2016). For example, Belgium received the promise from London and Washington to have its nuclear program fully endorsed via materials and knowledge due to Brussels' commitment to only sell Congo's nuclear materials to Western allies – and military-led material only to the United States and the United Kingdom (DE ANDRADE, 2006). Likewise, studies claimed the Atoms for Peace was crucial to reduce the nuclear ambitions from Switzerland – a country that reinforced its neutral position on geopolitics (see De Andrade 2006).

Atoms for Peace in Brazil played an important role. Throughout Latin America, the United States approached other countries such as Argentina, Colombia, and Mexico. In this context, even small powers (e.g., Uruguay and El Salvador) demonstrated certain interest on explore nuclear potentials to promote economic development (MATEOS; SUÁREZ-DÍAZ, 2016). During the 1950s, Brazilian president Kubitschek encouraged the Brazilian scientific community to cooperate with the United States to acquire a nuclear research reactor (IEA-R1) in 1956, based at the IPEN in São Paulo. It was the first nuclear reactor to operate in Latin America. Also, Brazilian diplomats negotiated with Washington to purchase other reactors to settle in Rio Janeiro and Belo Horizonte. To illustrate, the CDTN (Belo Horizonte), erstwhile IPR, received a research reactor called TRIGA – made in the United States – and its nuclear fuel from abroad³⁵⁵ (uranium- zirconium hydride (UHZr)) (Motta 2022). Curiously, the reactor sold to work in Rio de Janeiro (IEN), via a partnership with the United States Argonne National

³⁵³ Brazil. 1956. "Minutes of the Twentieth Session of the Brazilian National Security Council, Second Brazilian Nuclear Plan," August 30, 1956, History and Public Policy Program Digital Archive, National Archive (Brasilia). Obtained and translated by Fundação Getúlio Vargas. <https://dinuclear.projects.gitalarchive.wilsoncenter.org/document/116913>

³⁵⁴ Estado de S. Paulo. 1959. "Progresso no Emprego de Átomos Para a Paz". In: Arquivo Estado de S.Paulo". (30th July 1959).

³⁵⁵ Estado de S.Paulo. 1958. 'Reator para Belo Horizonte'. In: Arquivo Estadão. (28th August 1958).

Laboratory (Marzo 2022), was 93% assembled with national components in Brazil to adapt the machine to tropical hot weather (Patti 2021).

Although it represented a considerable step for the Brazilian nuclear plan, scientists showed certain uneasiness when the government started to strengthen atomic-related ties with the United States (de Lima 1986). Atoms for Peace's influence over the Brazilian nuclear program became a source of friction between academic groups versus diplomats, some scientists, and military officers who demonstrated a utilitarian perspective. Although the former endorsed national initiatives to master completely fissile material enrichment cycles, the latter attempted to boost the nuclear program via ready-to-use machines or tons of U²³⁵ from abroad. For example, General Juarez Távora³⁵⁶ advocated, in 1956, for cooperative ties with Atoms for Peace because they could provide solutions for local nuclear logistical issues. Such a perspective was widely criticized by nationalist sectors because it did not take into consideration the need to achieve independence from foreign aid. These agents considered the Atoms for Peace an unequal instrument for global cooperation because it hinged on Washington's policies. Whereas European allies from the United States had arguably enjoyed sensible technological transference, emerging regional powers were not granted these elements³⁵⁷.

Since this episode, it became evident a structural problem within the Brazilian nuclear program. Disputes between policymaking groups hinged on complex logic. The Brazilian government aimed to provide an immediate source of nuclear energy to develop the local economy while establishing an autonomous-led project. Whereas national programs demand time, training, and necessary resources to flourish, the government nourishes an anxious desire to employ atomic-related power to emulate great powers and boost industrialization. To illustrate, Brazilian documents stressed the ultimate aims of local nuclear policy: (a) enable a robust process of industrialization that consolidate economic growth, (b) put Brazil at the same level of development observed in the great powers, and (c) establish an autonomous project³⁵⁸.

Nuclear energy became a part of national programs to boost economic development during the 1950s and the 1960s. However, these ideas to “skip stages” were inconsistent with

³⁵⁶ Brazil. Câmara dos Deputados. “Comissão de Inquérito para Proceder a Investigação sobre o Problema de Energia Atômica no Brasil”. In: FGV-CPDOC, Arquivo Juarez Távora. (7th August 1956).

³⁵⁷ Brazil. 1982. ‘Conferência proferida pelo embaixador Paulo Nogueira Batista, Presidente da Nuclebrás, no Ministério das Relações Exteriores – Instituto Rio Branco’. In: FGV-CPDOC, Arquivo Paulo Nogueira Batista. (4th May 1982).

³⁵⁸ CNEN. Departamento de Planejamento e Coordenação. 1974. “Alternativas para a formulação das diretrizes de um planejamento nuclear brasileiro”. IN: Arquivos da CNEN.

the blossoming of national scientific projects. Yet Brazilian initial plans to use nuclear energy were theoretically too ambitious. In 1959, the national government asked CNEN to prepare a plan to build the first nuclear power plant in Rio de Janeiro. Likewise, another plant would be settled in the state of São Paulo via a consortium organized by the regional administration. The aim was to build these facilities to provide a new source of energy to a country that went through an industrialization process due to Kubitschek's policy for encouraging the establishment of foreign vehicle factories in the country.

The lack of wherewithal to put into practice ambitious nuclear plans also played a role because academic centers did not grant the necessary budget to proceed with these projects. As observed, Brazilian authorities usually presented a penchant to endorse huge projects aimed to provide promptly results. Such a utilitarian perspective reduced the funds to long-term researches to invest in expensive mammoth initiatives³⁵⁹ built via foreign technologies. Although the IEA was able to develop interesting studies about methods to produce uranium for fueling reactors (see Patti 2021), members of both scientific and military field feared that Argentina was establishing a more self-reliant nuclear program that could achieve its technological autonomy earlier than Brazil (see Lima 1986).

Political turmoil in Brazil played certainly an important role in this context. As previous literature demonstrate, the country was not able to establish a full-fledged nuclear plan, during the 1950s and 1960s, due to abrupt changes in the national political realm. Some interviews reinforced this assertive that domestic challenges to establish a robust nuclear policy hindered the Brazilian scientific development (Lainetti 2022; Simbalista 2022). To illustrate, Brazilian experienced, during the 1960s, a short-lived parliamentary attempt and went through a military-led dictatorship in 1964 – which lasted until 1985. Hence, administrations did not agree on developmental policies. It affected not only the establishment of a nuclear policy but also the budget destined to scientific research.

Although these governments shared a shallow agreement that cutting-edge technologies could boost economic growth and convey a prestigious international image, their ideas to give traction to related projects differed in essence. Nationalist-led strategies, during João Goulart's administration, aimed to support studies about thorium-plutonium fuel cycle reactors (Patti 2021). These strategies were fully endorsed by nationalist scientists like Marcello Damy. In an

³⁵⁹ It is not the purpose of this study delve into this subject, but some authors claimed the preference for these expensive projects could be arguably related to the corruption in the military-led government. See (CAMPOS, 2014)

official document, Goulart claimed nuclear energy would complement the hydraulic national potential via the establishment of a nationalist policy³⁶⁰. It would provide indigenous reactors to the UFPE and set a natural uranium-fueled power plant. This attempt reinforced some aspects observed in the previous nuclear plan of Quadro's brief administration in 1961. In 1962, Brazil inaugurated the Eletrobras³⁶¹ to coordinate the electric energy sector. The CNEN gained more autonomy to set atomic-related initiatives.

However, these plans did not prospered because of the 1964 military coup, which changed foreign policy strategies and nuclear projects. These “coming and goings” of Brazilian nuclear plans reduced the possibilities to establish a nationalist plan in favor of utilitarian perspective (Simbalista 2022). Since the formers need a consistent plan to flourish, the need for a prompt answer without a real plan encouraged decision-makers to rely on already made technologies from abroad (OLIVEIRA, 1991).

Foreign aid from the United States became a sort of easy track to solve issues related to building facilities and enriching nuclear materials (Goldemberg 2022). Nonetheless, some Brazilian policymakers and scientists started to grasp this as a mechanism to safeguard foreign influence over national policies and hinder the autonomous ambition of developing nuclear technologies. Brazilian documents sustained nationalist groups advocating for mechanisms of research that enable local scientists to master sensitive knowledge about nuclear technologies – that is, never renouncing the autonomy as a goal³⁶². The conclusion was that programs such as Atoms for Peace worked to make Brazil more dependent on foreign assistance, although it could facilitate a faster establishment of nuclear facilities. This assumption underpinned, likewise, in the fact that all nuclear-related research reactors made in the United States were subject of Washington agencies' surveillance and required the use of its enriched uranium (see Wrobel 1986).

Because of the influence of the United States programs in the Brazilian nuclear program, it was possible to find important documents describing the existence of subjective pressures against local scientific development. There was a rise of opinions that programs such as the Atoms for Peace existed to preserve the great powers' monopoly over critical technologies while

³⁶⁰ Brazil. Biblioteca da Presidência da República. 1964. ‘Mensagem ao Congresso Nacional’.

³⁶¹ Estado de S.Paulo. 1962. ‘Instalada a Eletrobrás; salientados os objetivos do novo organismo’. In: Arquivo do Estado de S.Paulo (12th June 1962).

³⁶² Brazil. 1967. Política Nacional de Energia Nuclear. In: FGV-CPDOC. Arquivo Paulo Nogueira Batista. (5th May, 1967).

fostering the profits of its private companies³⁶³. Those strategies were not punitive per se. They encouraged countries to acquire already-made machines than investing in national scientific sources. Emerging powers were considered potential eternal consumer in a market disputes between great powers. Although the United States worked to widespread nationally produced reactors, the United Kingdom, for example, started to commercialized natural uranium reactors by launching the Magnox during the 1950s.

During that time, Brazil had established some nuclear academic groups. For instance, CNEN endorsed, during the 1960s, three main research programs to provide national solutions for technologies issues: the Lane Group (to define the kind of reactor to be employed and the best place to set a nuclear power plant in cooperation with the IAEA). Likewise, there were the Thorium Group, and the Working Group for a Power Reactor (DE ANDRADE; DOS SANTOS, 1990). In addition, scientific agencies in São Paulo fomented the inauguration of the CENA, a nuclear research center at USP (Piracicaba) to employ these technologies in agriculture (a relevant economic sector for Brazil).

As observed, nationalist scientists developed different plans to overcome Brazilian nuclear dependency on great powers' technologies and aid. Despite the capacity of local scientists to develop cutting-edge nuclear mechanisms and the flourishing number of scholar centers in Brazil, the national government preferred to avoid diplomatic quarrels and acquire facilities from abroad. This choice for embedding nuclear policy into the foreign strategy enabled subjective pressures against nationalist projects. They could never achieve their total potential since Brazilian administrations did not set a full-fledged nationalist nuclear policy. In this sense, an important finding is that the possibility of acquiring foreign technologies via a diplomatic agreement with great powers and Western allies hampered the development of indigenous scientific initiatives. In so being, another finding in this context is that nationalist scientists complained that their researches faced many challenges because of diplomatic interests to avoid international stigmatization and preserve good relationships with great powers (see Lopes 1969).

For example, in Rio de Janeiro, scholars established a work group to produce nuclear energy via pressurized heavy-water reactors during the 1960s (Oliveira 1991). This project would count on logistical aid from Israel, but it was discontinued to avoid diplomatic skirmishes with Arab countries (Patti 2021). Likewise, national authorities did not believe these

³⁶³ Goldemberg, José. José Goldemberg (depoimento, 1976). Rio de Janeiro, CPDOC, 2010. 163 p.

technologies could provide the necessary results in the short-term. Another example were the studies conducted by professor Ivo Jordan in São Paulo. They presented initial results about uranium enrichment. Despite technical issues, it was arguably the first time (1966) that a Brazilian institution enriched uranium³⁶⁴ – a small proportion via production of UF⁶ particles at a rate of 0.0175 percent (Patti 2021). But, the CNEN suspended this research during a period when the United States raised some doubts about possible military purposes (Patti 2021)³⁶⁵.

Nonetheless, the most interesting case revolves around the Thorium Group organized in the IPR by scholars from the UFMG. This group was born after the publication of Jair Carlos Mello and Carlos Werth's works in 1965. Both scientists claimed thorium reserves could be employed to produce electric energy through fast-breeder reactors that morphed this fertile material into U²³³. It could make Brazil a pioneer center of these studies. Similarly, it could provide an alternative to the international market of uranium (OLIVEIRA, 1991).

The Thorium Group's *raison d'être* was delving into national alternatives to the foreign dependence in the nuclear realm. The IPR historically represented a nationalist scholar research institute, which was led by Francisco Magalhães Gomes. The IPR enjoyed some influence in the Working Group for a Power Reactor, created in 1965, to decide which kind of nuclear reactor would fit better to the national plans of building a power plant. The IPR counted with support with French, German, and Sweden universities and research institutes, but it was entirely financed by the CNEN and the UFMG. Likewise, it did not reject any sort of technological aid from the United States, since the IPR required the importation of tons of heavy water from their laboratories (CAMARGO, 2006).

The Thorium Group, in this sense, advocated for the employment of an atomic-related fuel cycle that did not let Brazil be dependent of enriched uranium from the United States³⁶⁶. It developed many studies and trained post-graduation students. Many Brazilian outstanding scientists joined the group or were trained there – for example, Witold Lepecki. The idea was to elaborate a long-lasting plan that could achieve satisfactory results in about third years to

³⁶⁴ CNEN. 1967. 'Relatório Anual'. In: Arquivo da CNEN.

³⁶⁵ United States. 1968. "Telegram from the Consul of the US in Sao Paulo to the Department of State, 'Brazilian Centrifuge Program'," May 16, 1968, History and Public Policy Program Digital Archive, RG 59, Subject-Numeric Files 1967-1969. Box 1169, Inco-Uranium Brazil <https://digitalarchive.wilsoncenter.org/document/145012>

³⁶⁶ UFMG. IPR. 1968. 'O grupo do Tório Face ao Panorama de Energia Nuclear no Brasil'.

fifty years – considering the possibility to establish mechanisms to work with a plutonium-thorium cycle³⁶⁷.

These scientists faced herculean challenges since their plans were not well developed in other parts of the world (DE ANDRADE, 2006). The energetic cycle to employ thorium as a fuel also represented a hurdle. Since it was a fertile material, transforming this material into U²³³ required different steps combined with natural uranium/heavy water and plutonium. The idea was not incredibly sophisticated in technological terms, but it demanded fast-breeder reactors, which were not considered safe machines. Despite this, members of the group registered these developments and published them. It triggered Brazilian academic interest in other areas like engineering and physics³⁶⁸. In 1969, the Thorium Group set a workforce to define the priorities to achieve its ultimate aim. It planned the construction of facilities such as laboratories. It also set up a pilot project to build a reactor.

Although this group could not assure the achievement of such an ambitious goal, it was a relevant initiative to promote nuclear studies in Brazil. As Fontes (2022) claimed in an interview, the necessary technology to work with thorium represented a challenge for nuclear projects. It risks consuming more energy than produced (Patti 2021) – somehow like the *jet nozzle*. Yet some interviews also demonstrated that the Thorium Group represented a symbolic ill-fated project of how the national government (Simbalista 2022) did not preserve scientific indigenous initiatives. This reduced interest over the use of thorium hinged also on institutional choices (Lainetti 2022) that did not encourage a long-term nuclear strategy with robust alternatives to the enriched uranium. The Thorium Group was discontinued in 1970 because the CNEN, headed by Hervásio de Carvalho, withdrew its financial support (De Lima 1986). CNEN archives stressed that ideas from the Thorium Group became outdated in other countries and thereby the agency would reduce its interest over natural uranium reactors³⁶⁹.

There are domestic reasons (e.g., political disputes) for this issue, but this non-supporting role toward Brazilian scientists sparked many critics. Scholars claimed Brazil was not taking into consideration the long-run consequences of external dependence (De Lima 1986). Yet Francisco Magalhães stressed that Brazilian lack of interest in the Thorium Groups

³⁶⁷ Brito, Sérgio et al. 1969. ‘O projeto “Instinto”’: Um programa de reatores a água pesada para o Brasil’. In: Arquivo Museu Memória da Eletricidade Eletrobrás.

³⁶⁸ Nuclebrás. CDTN. 1979. “Grupo do Tório: Breve Histórico”. (21st September 1979).

³⁶⁹ CNEN. 1970. “Relatório Anual”. In: Arquivos da CNEN.

was due to an international concern that this UFMG initiative could produce a nuclear weapon – although it has never been the purpose (Wrobel 1986).

Brazilian institutions reallocated Thorium Group scientists to other nuclear projects. The IPR was required to conduct other researches like defining an arguably place to build a nuclear facility in the Amazon region. During the same period, other policymakers, diplomats and scientists encouraged the government to go with light-water reactors (i.e., PWR). Brazilian scientists visited many countries to analyze nuclear reactors, but there was a growing movement to endorse the PWR. During the 1960s and 1970s, this kind of reactor became prevalent in the international market. It became the adequate machine to use in a nuclear-fueled submarine (a core objective to the Brazilian navy). In this sense, utilitarian decision-makers believed it could provide fast results and thereby support Brazilian industrialization and economic boom (Patti 2021).

Whereas Brazilian president in 1968 Costa e Silva reinforced a critical diplomatic instance against the nonproliferation regime³⁷⁰ – considered discriminatory -, the local dictatorship preferred to rely on foreign acquisitions to boost the nuclear project. This was a finding of how pervasive are the subjective pressures since they are not crystal-clear such diplomatic actions. In general, military administrations advocated for development programs based upon nationalist bases and attempt even to provide alternatives to the reliance on the United States capital and market. During the 1960s, Brazilian dictatorship engaged in diplomatic affairs with the West Germany - another country that complained against international pressure to adhere to the NPT.

The national government organized an international tender opened in 1970 to start the project of building a national nuclear power plant – regardless of the existence of local initiatives. Although Brazil expected proposals from seven companies, it received only five from Sweden, the United States, Germany, and Canada. Brazil decided to acquire a PWR reactor from Westinghouse based on a turnkey agreement. That is, the machine arrived ready for usage. There was no mechanism to transfer technology from the United States to Brazil. The agreement was defined between Brazilian authorities and the Westinghouse staff between 1971 and 1972. The employed enriched uranium came from the United States. Washington could even delay some sales of this material due to contractual demands. In this sense, the

³⁷⁰ Brazil. 1967. “Minutes of the Fortieth Session of the Brazilian National Security Council,” October 04, 1967, History and Public Policy Program Digital Archive, Archive of the Brazilian Foreign Ministry (Brasilia). Obtained and translated by Fundação Getúlio Vargas. <https://digitalarchive.wilsoncenter.org/document/116914>

national nuclear plan assumed certain risks of being dependent on a foreign part. The bilateral agreement revolved around IAEA rules, and it enabled the building of Angra I – the first Brazilian nuclear power plant settled in Angra dos Reis (Rio de Janeiro).

Years later, Brazilian documents attested that this agreement increased national vulnerability over the United States interests and market options³⁷¹. Curiously, the United States diplomacy in 1968 concluded that Brazilian nuclear policy would face more challenges to consolidate its nuclear nationalist projects due to the reduced scientific staff resources³⁷². Although the military-led dictatorship attempted to boost uranium exploration in Bahia and Ceará via private companies (Patti 2021), its policymakers reduced the incentives for scientific development by taking over the control of nuclear-related initiatives without consulting academic communities. A relevant issue demonstrate military and diplomatic officers claimed to pursue nationalist alternatives to Brazilian nuclear program, but they did not include many scientists in the discussions. Some of them were in exile. Authoritarian acts reduced the space for criticism against the national decisions (DE ANDRADE, 2006).

This issue induced Brazil to engage in utilitarian-led nuclear initiatives. Brazilian military dictatorship took draconian measures in the name of materializing mammoth projects (SIGAUD et al., 1988) – which were contested later even for corruption allegations (Dalaqua 2017). Indeed, the Brazilian dictatorship attempted to reduce the nuclear vulnerability vis-à-vis the United States. It created the Nuclebrás³⁷³ to conciliate nuclear policies with developmental ideas from Geisel’s administration in 1974. Since national plans hinged on finding multiple foreign partners, the diplomat Paulo Nogueira Batista was appointed as the first chairman of the company (Patti 2021).

During this period, the 1973 oil crisis affected the Brazilian trade balance because the price of this commodity skyrocketed. It stimulated decision-makers to find a prompt solution to promote alternative sources of energy – such as hydroelectric mechanisms and nuclear technologies. Noticing the lack of scientists and practitioners to deal with atomic-related initiatives, the Brazilian government created an academic initiative from 1976 to 1986 called the Pronuclear headed by Rex Nazaré. It promoted academic partnerships with institutions from

³⁷¹ Brazil. 1980. “Relações Brasil-Estados Unidos do Campo da Energia Nuclear”. In: FGV-CPDOC. Arquivo Paulo Nogueira Batista. (06th November 1980).

³⁷² United States. 1968. "Airgram from the Embassy of the US in Rio De Janeiro to the Department of State, 'Assessment of Brazilian Nuclear Device Capability'," March 23, 1968, History and Public Policy Program Digital Archive, RG 59, Subject-Numeric Files 1967-1969. Box 2895, AE 1 Brazil <https://digitalarchive.wilsoncenter.org/document/145011>

³⁷³ Estado de S.Paulo. 1974. “Governo cria a Nuclebrás”. In: Arquivo do Estado de S.Paulo. (30th October 1974).

the United Kingdom, Israel, Belgium, Japan, West Germany, France, and the United States but it did not achieve the expected results due to bureaucratic issues and a lack of scientific formation in Brazil (see Souza 2021).

These differences between nationalist interests and utilitarians became more evident during the 1975 West Germany-Brazil nuclear agreement. Although policymakers (e.g., Paulo Nogueira Batista) defended it as a nationalist initiative³⁷⁴ that promoted the transference of technology to Brazil, academic groups considered it a failed model. In some open letters (see Oliveira 1991), scientists and industrial businesspeople (Goldemberg 2022) criticized the agreement for conceding many strategic areas to foreign institutions but not stimulating domestic projects. Since the agreement aimed to make Brazil achieve the whole enrichment uranium cycle³⁷⁵ via bilateral companies, it enabled Germans to hold sway over many decisions. It is worthwhile to remember that Brazilian companies developed a sort of advocacy defensive strategy against external competitors. In this sense, some of them also reinforced that private German companies and investors would not take into consideration Brazilian national ambitions³⁷⁶. To illustrate, Nuclebrás administrated a holding composed of sectorial enterprises created, during the 1970s, to develop the local nuclear program with German capital: Nuclep, Nuclei, Nuclen, and Nuclam³⁷⁷ (ALMEIDA, 2015).

As Vinhas said (2022), the agreement promoted the acquirement of nuclear-related machines for the INB and the power plant Angra II – inaugurated only in 2001. Yet, domestic groups claimed the agreement could not attain their ambitious plans to establish fifteen nuclear power plants until the 1990s. Some engineering groups claimed hydroelectric sources could represent a more nationalist autonomous solution than relying on an agreement with another country regulated by IAEA's safeguards. Despite this partnership between Brazil and West Germany being considered a serious blow to great powers in diplomatic terms to prevent nuclear proliferation, it was not a nationalist initiative. Hence, it was not a mechanism *per se* to

³⁷⁴ Brazil. 1974. "Memorandum, Information for the President of Brazil, No. 055/74 from the National Security Council," August 13, 1974, History and Public Policy Program Digital Archive, Centro de Pesquisa e Documentação de História Contemporânea do Brasil (CPDOC), Azeredo da Silveira Archive, AAS1974.o8.15 mre/pn [1/661]. Obtained and translated by Fundação Getúlio Vargas. <https://digitalarchive.wilsoncenter.org/document/116915>

³⁷⁵ Brazil. 1979. "Notice No. 135/79 from the General Secretariat of the Brazilian National Security Council," June 18, 1979, History and Public Policy Program Digital Archive, Archive of the Brazilian Ministry of Foreign Affairs (Brasília). Obtained and translated by Fundação Getúlio Vargas. <https://digitalarchive.wilsoncenter.org/document/116916>

³⁷⁶ Batista, Paulo Nogueira. 1992. '60 Anos de Política Externa – O Acordo Nuclear Brasil-República Federal da Alemanha'. In: FGV-CPDOC, Arquivo Paulo Nogueira Batista. (23th July 1992).

³⁷⁷ Each of these enterprises played a role to consolidate the Brazilian nuclear program in cooperation with German capital. Nuclen coordinated the production of technological mechanisms and elaborated projects to build powerhouses. Nuclep developed heavy components to assemble nuclear technologies. Nuclam was responsible for the mining of minerals. Nuclei worked with uranium enrichment technologies.

escape the Middle Power Trap. It was vulnerable to the subjective mechanism that did not encourage technological development.

Examples of this affirmation are not a few. For example, Nuclep was a company aimed to foster the production of atomic-related technologies. However, German companies could indicate their directors. Likewise, Nuclam had to share a percentage of its products regardless of the aim to supply Brazilian scientific institutions. Indeed, these enterprises faced many bureaucratic issues (ALMEIDA, 2015). The lack of interest to coordinate strategies with other Brazilian companies reduce the private budget available to maintain the Nuclep – Nuclebrás assumed 97 percent of the company during the 1980s. Local businesspeople started to complain also about the lack of a long-lasting predictable nuclear program in which they could understand national plans. Finally, Nuclemon³⁷⁸ – a company created to explore monazite sands - became a juridical problem. Since its facilities were in São Paulo and workers were not well equipped to handle radioactive materials, there are many juridical processes running over this issue. The company was deactivated.

In this sense, the Brazilian nuclear program became more vulnerable to international interference since policymakers did not assume a nationalist position of defining a feasible long-lasting S&T policy that championed indigenous scientific centers as mechanisms to attain nuclear autonomy. This subsection depicted that Brazil employed foreign assistance as a shortcut to obtaining nuclear energy without strengthening scientific initiatives. Even if the secret program attained the mastering of the nuclear fuel cycle in 1987, decisions over preferring acquiring imported elements than investing in S&T reduced local potential to consolidate a robust nuclear industry. Great powers encouraged Brazil to accept this position of a country that received sensitive technologies from industrialized poles, but policymakers, as I noticed, did not respond properly to this challenge. Yet, these policymakers were lured into the idea that these offers would promote S&T development without taking into account the necessity to fund local scientific groups and initiatives.

³⁷⁸ On the continuity of studies using thorium, I asked Dr. Lainetti (2022) and Dr. Vicente (2023) about the continuity of studies on thorium in Brazil. Indeed, it occurred without the erstwhile relevance. In fact, West Germany would sound, in this way, an interesting partner for Brazil because it tried to pursue the diversification of technologies – unlike the United States and the United Kingdom who became promoters of the enriched uranium system. I found documents that attested that West Germany institutes tried to foment researches with thorium in Brazil due to the 1975 agreement. See (Brazil. 1975. “1.4. Negociações em Curso”. In: FGV-CPDOC. Arquivo Paulo Nogueira Batista). The lack of funds and political interest hampered the development of this cooperative ties again.

6.3. Concluding Remarks

This chapter explained the outcome observed in Brazilian nuclear history. This causal process corroborated the proposed hypothesis about the Middle Power Trap. As I pointed out, Brazil is an emerging regional power that attempted to master nuclear energy for domestic reasons (e.g., promoting industrialization and providing an alternative energy source) and attain international prestige. However, the Middle Power Trap assumed a decisive role in hampering the achievement of full-fledged nuclear autonomy. Although President José Sarney announced in 1987 that Brazil's secret program obtained the know-how to master nuclear fuel cycles and the ultracentrifuge methods, the successive NWSs pressures and instruments for constraining national S&T decisions reduced the possibilities of this country effectively consolidating a nuclear industry. For instance, NWSs and international instruments did not allow Brazil to install reprocessing fuel plants or facilities to produce UF₆.

The Middle Power Trap, in this sense, affected the S&T development of Brazil since NWSs tried to curb the consolidation of a nuclear program from a state that disagreed with the reduced role granted by great powers to NNWSs in the multilateral decisions aimed to produce the nonproliferation regime. During the analyzed period, Brazil tried to morph into a great power via scientific development combined with industrialization programs. But, Brazil faced the minor status that NWSs relegated to this country – a supplier of nuclear raw materials, not a technological center. Brazilian policymakers developed different strategies to address this diplomatic-scientific issue. However, it coped with a domestic reticence to go against the interests of great powers such as the United States, promoters of the Western-led world order.

I noticed the use of direct and indirect ways of pressure to make Brazil choose to abide by rules and accept the traditional middle power behavior – a peaceful power that respects international mechanisms (although sustaining disagreements). Brazilian authorities retroceded initial plans to elaborate a nuclear autonomous program in order to avoid pressures, e.g., the national denial that it would conduct a nuclear explosion in the 1980s and the coding of the peaceful atomic purpose in the 1988 constitution. In the table 9, I summarize the direct and indirect mechanisms that I unveiled during this research. These elements increased the confidence that the Middle Power Trap is a causal mechanism composed of instruments led and designed by great powers to constrain deviance in the nuclear field – regardless the peaceful announced interests of the targeted country.

Table 9 – The Middle Power Trap's Instruments against Brazil.

Direct	Indirect
Refusal of sales to Brazilian nuclear institutes	Diplomatic pressure
Conditioning nuclear projects to Brazilian acceptance to nonproliferation rules	Boycotts to Brazilian S&T programs
Imposition of restrictions to Brazilian nuclear ties with other partners and adherence to the international market	Menaces of stigmatization
Condition sale of sensitive technologies to the IAEA's safeguard system.	Foreign assistance catalyzing S&T dependence on importation
	Efforts to make Brazil accept being a minor player in nuclear diplomatic negotiations

Sources: Own elaboration

An element that strikes me most is the lack of a long-lasting S&T policy in Brazil. Policymakers changed their plans according to the national administration or established unfeasible mammoth projects that envisaged mainly the results without taking into consideration how to nationally reach these objectives. In this sense, reduced investments in S&T and the lack of budget for preserving indigenous-led scientific initiatives fomented by public universities in Brazil became a core variable to be addressed during this research. It seems an interesting aspect that interfered with the outcomes: facilitating the Middle Power Trap to produce an expected result.

Brazil could not mobilize the necessary efforts to cope with this great powers-led causal mechanism because local policymakers did not establish a full-fledged S&T policy to preserve initiatives that sought to attain nuclear autonomy and the master of cutting-edge technologies. In conclusion, Brazil thought mastering the nuclear fuel cycle would be the main goal to attain – for producing a nuclear-powered submarine, for example – but failed to sustain a robust industry to boost national development.

There was not a clear incentive to preserve the Brazilian nuclear program from the Middle Power Trap since S&T has never been considered a national priority in terms of funding local scientific instruments. Indeed, the Brazilian nuclear program was a topic that revolved around navy decisions and a reduced group of policymakers related to the armed forces – a context that did not enjoy sympathy from democratic leaders. In so being, the lack of participation of the scientific community and the restriction of decisions to a military-led group

did not enable a social feeling towards the nuclear program as an S&T symbol of national prestige. In addition, the radiological Goiania accident (1987) involving Caesium-137³⁷⁹ (Cs-137) tarnished the image of this program and the CNEN (see Oberhofer and Bacelar Leao 1988; Vinhas 2003). In a moment of economic crisis (the 1980s) (see Wrobel 1986), Brazilian administrations had no incentives to sustain the robust budget to finance unpopular programs that faced the pressure from the Middle Power Trap.

Thus, the conclusion that I arrived at is the following. The Middle Power Trap is a crucial explanatory element to understanding Brazilian nuclear history. This causal mechanism, proposed as the main hypothesis of this dissertation, worked as previously imagined. Inductive elements filled some important aspects to reinforce the features of this hypothesis and explain why results are not deterministically produced – I suggest that S&T policies (the role of policymakers) are a core factor for discussing the capacity of emerging regional powers to handle the Middle Power Trap. To sum up, the proposed hypothesis about the effects of the Middle Power Trap to the S&T development of an emerging regional power facilitates the understanding of the Brazilian nuclear history.

As I proposed in Chapter 4, Brazil tried to defy great powers' regulatory plans to preserve the world order and their exclusive social position. The international regime worked to legitimize pressures and receive endorsement from other countries – mainly the traditional middle powers. Brazilian policymakers developed their initiatives to handle both indirect and direct ways of pressure, but they failed to resist the pervasiveness of the great powers' causal forces via the Middle Power Trap. Inductively, this research claims that the lack of a long-lasting S&T policy that took into consideration scholarly opinions and provided a fertile terrain for scientific centers to attain nuclear autonomy is a crucial element to explain why Brazil was not able to handle the Middle Power Trap. I use, in this sense, the shadow case about India (chapter 7) to reinforce my findings and observe some elements from a state that managed the causal forces promoted by the Middle Power Trap.

³⁷⁹ This is considered the world's worst radiological incident involving civilians. After scrap metal pickers invaded an unsecured radiotherapy source in 1987 and sold to a junk yard. The owners of this place brought this blue-colored element to their houses and workplaces objects filled with Caesium-137 from a former radio-X instrument. About 100.000 people were examined, and authorities found many cases of people facing a degree of contamination – besides the social stigmatization. It mobilized even the Navy's hospital to handle the situation by providing specialized treatment. This sad chapter of Brazilian history remembers with sorrow the case of the girl Leide das Neves who died intoxicated by the Caesium-137.

7. INDIAN NUCLEAR HISTORY

India represents a case of emerging regional power that coped with international pressure to attain a robust level of development of the national nuclear industry. By avoiding a comparative research design, this section describes a process where the Middle Power Trap did not induce an expected outcome. Although New Delhi faced many hurdles and the national nuclear program is not entirely autonomous, it contrasts with the lion's share history of nonproliferation in the Global South/Third World due to the resilience of a long-lasting S&T policy to morph this country into a great power.

During this chapter, I depict Indian nuclear history employing secondary sources, semi-structured interviews with Indian scholars, and official documents. It highlights the international mechanisms applied to pressure India, the strategies to build the atomic program, and the role of policymakers in drawing these policies. I pinpoint two aspects: (a) Indian political leadership promoted scientific elite to draw a nuclear policy without domestic vetoes and international constraints, and (b) New Delhi used foreign assistance to strengthen indigenous scientific initiatives. I did not ignore existing criticism against the Indian nuclear story.

For instance, the conclusion that India's long-lasting S&T policy derives from the resilience of a strategic enclave, borrowing a term from Abraham (1998), comprising the policymakers from scientific and political fields. It excluded other agents from decision-making processes and stigmatized critical domestic opinions as antinationalist thinking. Meanwhile, there are many doubts about the feasibility of the envisaged projects – for example, India has kept initiatives to employ thorium as a fertile material to produce U_{233} . This plan faces criticism since it is still under development. I divided this chapter into three moments. Firstly, I describe the development of Indian nuclear history. Secondly, there is a discussion about the “direct” and “indirect ways” applied to change New Delhi's decision to go nuclear without adhering to nonproliferation rules such as the NPT. Finally, there is a section detailing some concluding remarks.

To sum up, this chapter reinforces a finding observed in the Brazilian case: a full-fledged S&T policy is crucial for emerging regional powers handling the causal pressure from the Middle Power Trap. Whereas Brazil lacked this political understanding of how important is to endorse national scientific initiatives to strengthen a nuclear industry, India focused on attaining nuclear autonomy due to the influence of scientists and practitioners in the

policymaking process. As further detailed in section 7.3, the entrenched political belief that science could promote the development of the country sustained a long-lasting plan in India. Meanwhile, Brazilian leaders conditioned scientific advancements to their interests in solving punctual crises and enjoying international prestige. Minding that it is not a comparative study, I am not proposing any in-depth conclusion based on the observation of the two cases. However, the relevance of S&T policy could provide valuable insights into the debate over the Brazilian case.

I would pointed out four elements to pay attention during the chapter that motivated the persistence of India in attaining its nuclear ambitions: the anticolonial mindset, this valorization of the scientists, the political interests on S&T since this field represented a mechanism to promote economic development, and the ultimate objective of obtaining technological self-sufficiency. The following sections reinforce that sociopolitical context influenced the outcome observed, the Middle Power Trap failed to tame India under an international discipline. Actually, if I could summarize this whole context into a single citation, I would use Cohen's (2000, 16) description of Indian motivations to cope with international pressures:

[T]he nuclear program is one in a series of important symbolic projects that the centre has undertaken to develop a sense of Indian nationhood and identity. The content of that nationhood is, when projected through the prism of the bomb, a scientifically adept, multicultural people capable of achieving great things with minimum resources. Originally, the symbolic meanings were attached to the civilian nuclear program, and its leadership often boasted of the way in which Indian talent and innovativeness thrived under the adverse conditions brought about by Western economic sanctions and technology restraint regimes. Tamils, Telugus, Parsis, Punjabis, Bengalis, high-caste and low-caste, Muslim, Sikh, and Hindu all contributed to the effort. The underlying philosophy is that no single Indian state is capable of such a project and that only by working together can the diverse peoples of India accomplish such great deeds.

7.1. The development of Indian nuclear policy.

Like Brazil, India's nuclear history begins with the exploitation of monazite by Western powers (e.g., Germany and the United Kingdom) to feed the gas mantle and flint stone industries during the XIXth century (KLINGER, 2015). As part of the British Empire until 1947, this historical moment revolves mainly³⁸⁰ around disputes between foreign agents to access Indian raw materials. In conclusion, the origins of the Indian scientific modern industry derives from a colonial logic where the local production served to supply Western powers with materials. The redefinition of geopolitical features triggered by WWI and WWII introduced new actors in this

³⁸⁰ Domestic elites joined this episode in a different way. At that time, the acknowledged main source of monazite in India was at the kingdom of Travancore. Local elites attempted to use it as a bargaining asset to sustain the local independence from India, during the independence process in 1947 (SARKAR, 2022).

context, such as French companies and the US government interested in extracting and buying strategic materials to foment scientific initiatives like the Manhattan Project (SARKAR, 2022).

Yet, the Indian elite had nourished close ties with foreign scientific institutions and universities - for example, many young scientists enrolled in Ph.D. programs in the United Kingdom and the United States (ABRAHAM, 1998). Among these names, there are relevant agents for developing nuclear studies in India, like Meghnad Saha, Shanti Bhatnagar, and Homi Bhabha. In this sense, the establishment of national scientific initiatives in India occurred before the independence since these scientists paid close attention to the potential of S&T fields to promote local development (ANDERSON, 2019).

Indeed, India established the first research institute in Asia (IACS) (1876) aimed to explore medical issues and homeopathic studies and hosts the academic journal *Indian Journal of Physics* since 1926 (ANDERSON, 2019). These ambitions to promote cutting-edge scientific development in India converged with interests of domestic groups in fostering educational programs to reduce local dependence on Western powers. It was a desire of the Tata group³⁸¹ who financed the establishment of the IISc in Bangalore during the 1910s (SARKAR, 2022). Although the British Empire left India suffering from many social and economic problems, it is relevant to bear in mind that this country presented the establishment of an academic life during that time. Table 10, based upon data from Kapur (1994), details all research institutes that blossomed before Indian independence.

Table 10 – Indian scientific initiatives before the independence

Institution	Year
IACS	1876
Botanical Survey of India	1890
Haffkine Institute	1899
Agriculture Research Institute	1905
Forest Research Institute	1906
Central Research Institute for Medicine	1906
Tea Research Institute	1911
IISc	1911

³⁸¹ India. "Historical Note on Tata Institute of Fundamental Research", January 1, 1954, Wilson Center Digital Archive, Institute for Defence Studies and Analyses (IDSA), Tata Institute of Fundamental Research, Homi Bhabha Papers, IDSA-HBP-01011954. Obtained and contributed by A. Vinod Kumar and the Institute for Defence Studies and Analyses. <https://digitalarchive.wilsoncenter.org/document/114193>

Indian Science Congress Association	1913
Zoological Survey of India	1916
Bose Institute	1917
School of Tropical Medicine	1921
Dairy Research Institute	1923
Cotton Technology Lab	1924
Malaria Institute	1927
Nutrition Research Institute	1928
Academy of Sciences	1930
Indian Statistical Institute	1931
Institute of Public Health and Hygiene	1934
Indian Academy of Sciences	1934
National Institute of Sciences	1935
Institute of Sugar Technology	1936
National Planning Committee	1938
Jute Research Institute	1939
Council of Industrial and Scientific Research	1942
The Tata Institute of Fundamental Research	1945
Research Committee on Atomic Energy	1946
Institute of Paleobotany	1946

Source: own elaboration based upon data from Kapur (1994)

This flourishing scientific agenda in India found support in philanthropist groups. In 1944, Homi Bhabha wrote a letter to Sir Dorab of the Tata group demanding financial support to establish an advanced physics university and cosmic rays in Bombay to foment scientific-related careers in the country and overcome hurdles for industrialization³⁸². Meanwhile, this growing interest in S&T called attention from domestic political leadership. Before the independence, Punjab's leadership asked Bhatnagar for planning strategies to promote scientific and industrial research (ANDERSON, 2019). Scientific congresses received endorsement from businesspeople and politicians (PERKOVICH, 2001). As observed in table 10, Indian politicians started to draw institutions to plan S&T policies during the 1940s, like the Council of Industrial and Scientific Research.

³⁸² Bhabha, Homi. 1944. "Letter from Homi Bhabha to Sir Dorab of Tata Trust", March 12, 1944, Wilson Center Digital Archive, Institute for Defence Studies and Analyses (IDSA), Tata Institute of Fundamental Research, Homi Bhabha Papers, IDSA-HBP-12031944. Obtained and contributed by A. Vinod Kumar and the Institute for Defence Studies and Analyses. <https://digitalarchive.wilsoncenter.org/document/114188>

It is a crucial factor because Indian elite demonstrated an entrenched interest in fostering S&T policies due to anticolonial sentiments and ideas that industrialization could strengthen national growth. Minding that leaders such as Nehru claimed India represented a great power (i.e., a global leadership as observed in his speech “Tryst with Destiny” in 1947 (see Nehru 1997)), political leaders struggled to define policies to attain this goal.

This context illustrates three crucial aspects of the history of the Indian nuclear program. Firstly, atomic-related issues are part of this state's relationship with great powers before its independence. Since Indian scientists and politicians shared linkages with foreign institutes, they pursued national development using local resources. It involved an anticolonial issue where Indians aimed to reduce their dependence on foreign agents (PERKOVICH, 2001) – likewise, race and colonial aspects prevented some Indian world-class scientists to carve out careers in the Western powers and, consequently, it nourished a will of revenge (PERKOVICH, 2001).

Secondly, political leaders and businesspeople often converged that employing Western-based scientific tools could promote economic growth, preserve democratic institutions, and fulfill their ambitions of making India a great power in the existing world order. For example, leaders as Nehru challenged Gandhi's understandings by arguing Indian economic policies had to master Western modern technologies and follow the path of robust industrialization via planned strategies revolving around public sector control (see Joshi 2017). Indeed, Nehru believed India was colonized due to the backwardness in terms of scientific development vis-à-vis the United Kingdom (Bajpai 1998). Bhabha claimed the difference between great powers and other countries was the fact that the former developed their economies based upon a modern scientific structure (Bhabha 1966). Not by chance, New Delhi decided for the creation of a Ministry of Scientific Research a year after the independence (1948)³⁸³.

Finally, S&T filled a crucial role in this field since these policymakers reckoned on scientific development to overcome underdevelopment and economic problems. Scientists

³⁸³ India. "Council of Scientific and Industrial Research Director Shanti Swaroop Bhatnagar to Bhabha", May 28, 1948, Wilson Center Digital Archive, Institute for Defence Studies and Analyses (IDSA), Tata Institute of Fundamental Research, Homi Bhabha Papers, IDSA-HBP-28051948. Obtained and contributed by A. Vinod Kumar and the Institute for Defence Studies and Analyses.
<https://digitalarchive.wilsoncenter.org/document/114191>

became valorized assets to the national ambitions of promoting solutions for crucial puzzles.

As Nehru claimed in a speech in 1962:

We are entering into an age now of the scientists beginning to function like the old high priests of old who locked after sacred mysteries; we all bow down to them in reverence and awe and sometime in little fear as to what they might be upto³⁸⁴.

Whereas businesspeople funded scientific proposals during the 1940s (the creation of the TIFR), some scientists enjoyed close relations with domestic policymakers – namely Homi Bhabha who formed the Indian Atomic Energy Research Committee in 1946 (before the independence). It allowed Homi Bhabha to consolidate his strategies to boost Indian scientific development – winning a competition against rival proposals from Meghnad Saha. Unlike the Saha, Bhabha was not keen on investing in universities³⁸⁵, but in a network of high-specialized research centers led by specific scientists without political interference. Likewise, military officers were left aside in this decision-making process due to bureaucratic concerns of granting power to them in a context of democratic stabilization (ABRAHAM, 1992; PERKOVICH, 2001). It would involve the state as the fundamental driver of these studies, but scientists would take over the process.

Hence, graduating courses and scholarly groups would be promoted by the demands of central institutions such as the Atomic Energy Research Committee. In this sense, India would emphasize scientific fields considered cutting-edge technologies that could provide the country with international prestige and elements to promote economic growth – for example, atomic energy considered a modern source of electrical power. As Bhabha argue in 1948 to Nehru:

³⁸⁴ Nehru, Jawaharlal. 1962. “Speech Delivered by the Prime Minister on 15.1.1962 on the Occasion of the Inauguration of the new Buildings of the TIFR at Colaba”. In: Manohar Parrikar Institute for Desence Studies and Analyses. See <https://www.idsa.in/npihp/documents/IDSA-TIFR-15011962c.pdf>

³⁸⁵ It is the root of a historical complaint of Indian scholars from other areas. There is literature on this topic. It argues that other scientific fields received less support from the government (see Abraham 1998; Alejandro 2018). Thus, science worked for a political project built in tandem with a specific group of scientists. Indeed, Bhabha wanted a complete coordination of S&T policy towards the planned goals. About this topic, he wrote: “[I]t is necessary that fundamental atomic research and teaching should be fostered in the universities and research institutes. For this purpose atomic research may be defined as physical research on the nuclei of atoms and the elementary particles out of which they are made or which play a role in determining their properties, and biological or chemical research involving the use of radio-active nuclei or artificially made or separated stable nuclei- it therefore includes specifically research in nuclear physics and cosmic rays, and biological or chemical research using tracers, it is essential in order to avoid lack of co-ordination and unnecessarily duplication that all such grants should be made only by the proposed Department of Scientific and Industrial Research after the schemes have been submitted to the Atomic Energy Commission and been approved, or better still by the Atomic Energy Commission itself (see: Bhabha. Homi. 1948. “Note on the Organisation of Atomic Research in India by H.J. Bhabha, Chairman, Board of Research on Atomic Energy.” In: The Department of Atomic Energy. The architects of atomic energy programme in India. 2008).

The Report submitted to you, Mr Prime Minister, on my return from Europe and America collected evidence which made it reasonable to believe that within the next couple of decades atomic energy would play an important part in the economy and the industry of countries and that, if India did not wish to fall even further behind the industrially advanced countries of the world, it would be necessary to take more energetic measures to develop this branch of science and appropriate larger sums for the purpose³⁸⁶.

Nuclear energy assumed a central role in the S&T policy due to the convergence of interests between scientists (e.g., Homi Bhabha) and policymakers (e.g., Jawaharlal Nehru). Both considered mastering nuclear technologies the apogee of science at that time (PERKOVICH, 2001). The Prime Minister claimed that atomic power could be a worthy manner to promote the development of the Third World:

I should like the House to remember that the use of atomic energy for peaceful purposes is far more important for a country like India whose power resources are limited, than for a country like France, an industrially advanced country. Take the United States of America, which already has vast power resources of other kinds. To have an additional source of power like atomic energy does not mean very much for them. No doubt they can use it, but it is not so indispensable for them as for a power-starved or power-hungry country like India or like most of the other countries in Asia and Africa. I say that because it may be to the advantage of countries which have adequate power resources to restrain and restrict the use of atomic energy because they do not need that power. It would be to the disadvantage of a country like India if that is restricted or stopped³⁸⁷.

In this sense, an important finding is that scientists were crucial in defining the nuclear policy during this period. Such a euphoria reduced the room for debates about costs and technical difficulties (see Tomar 1980). Since the goal was developing a robust national nuclear industry, New Delhi introduced in 1948 an Atomic Energy Act inspired in the then-existing British S&T legislation to foment projects to train workers in the fields of physics, chemistry, and engineering, establish state's monopoly over raw materials and give more agency to scientists in driving the nuclear policy³⁸⁸. As Perkovich (2001) noticed, this act provided also a juridical pillar for India manage trade ties with other countries interested in acquiring local raw materials such as thorium and beryl ore³⁸⁹. This initiative found some specific clients such as Canada and France – interested in advancing globally in studies about thorium.

³⁸⁶ Bhabha, Homi. 1948. "Note on the Organisation of Atomic Research in India by H.J. Bhabha, Chairman, Board of Research on Atomic Energy." In: The Department of Atomic Energy. The architects of atomic energy programme in India. 2008.

³⁸⁷ Nehru, Jawaharlal. 1954. "Control of Nuclear Energy, Statement by Prime Minister Jawaharlal Nehru in Lok Sabha (10 May 1954)". In: India. MEA archive. See <https://meaindia.nic.in/cdgeneva/?pdf0602?000>

³⁸⁸ 1962 Indian Atomic Energy Act reinforced the centrality of state in coordinating this field, see: India. 1962. "The Atomic Energy Act 1962 No.33 of 1962" (15th September, 1962). <https://www.aerb.gov.in/images/PDF/Atomic-Energy-Act-1962.pdf>

³⁸⁹ India faced hurdles in convincing great powers (mainly the United States) to use their raw materials in exchange for technological transference since Western countries could rely on similar sources in Brazil and South Africa. Likewise, it did not assume a concise tilt toward a geopolitical pole by emphasizing the non-alignment while cozying friendly ties with the Soviet Union.

It is worthwhile to bear in mind that politicians still played a role in this policymaking process - mainly the Prime Minister. Although scientists and bureaucratic officers tried tentatively to ensure the isolation of the Indian nuclear policy, political leaders handled some issues according to their understandings – for example, Nehru did not authorize effective and official movements toward the production of a nuclear weapon. It was a desire from some scientists to explore all sorts of atomic potentials – including possible explosive tests. Nehru aspired to use nuclear energy only for peaceful reasons. It kept moral values for guiding Indian foreign policy like non-violence and pacifism – replying to Gandhi’s repudiation of weapons of mass destruction³⁹⁰. The then Prime Minister reinforced this morality in the usage of S&T activities by emphasizing that India would diplomatically work against the proliferation of atomic, hydrogen, bacterial, chemical, and other weapons that could threaten humankind’s future³⁹¹. As documents demonstrated:

The Prime Minister opened the Proceedings by saying that India’s interest in atomic energy is solely for its peaceful uses. Quite apart from the fact that she had not the resources to make atomic bombs and use atomic energy for military purposes, she was not interested in its military use on principle. When he was in America, he had met a number of atomic scientists and he had told them that he was in not interested in atomic bombs, but solely in the peaceful uses of atomic energy³⁹².

In so being, India became one of the first countries to sign the PTBT in 1963. Yet, Nehru did not close the possible door for nuclear tests for assembling atomic explosive devices³⁹³ – in an era where the United States explored the Project Plowshare. The literature on Indian nuclear history has already pointed out this ambiguity between morality and the desire for international prestige (see Perkovich 2001; Sarkar 2022). Documents demonstrated that Bhabha constantly tried to cajole the Prime Minister to acquiesce to scientific initiatives involving Pu²³⁹ to show the national S&T development worldwide³⁹⁴. This context resulted in peculiar outcomes since

³⁹⁰ Gandhi, Mahatma. 1946. “Atom Bomb and Ahimsa, article by Mahatma Gandhi in Harijan in 1946” In: India. MEA archive. see <https://meaindia.nic.in/cdgeneva/?pdf0604?000>

³⁹¹ Nehru, Jawaharlal. 1954. “Stand-still Agreement, Statement by Prime Minister Jawaharlal Nehru in Lok Sabha. (02 April 1954)”. In: India. MEA archive, see: <https://meaindia.nic.in/cdgeneva/?pdf0601?000>

³⁹² India. "Minutes of a Special Meeting of the Indian Atomic Energy Commission", January 16, 1950, Wilson Center Digital Archive, Bibliothèque Nationale de France (BnF), Institut Curie Archives, Paris, Carton F-86, CEA: Relations avec l’Inde (1948-50), Papers of Frédéric Joliot-Curie. Obtained for NPIHP by Jayita Sarkar. <https://digitalarchive.wilsoncenter.org/document/117735>

³⁹³ UN. 1968. “No. 6964. Treaty Banning Nuclear Weapon Test in the Atmosphere in Outer Space and under water. Signed at Moscow, on 5 August 1963. United Nations – Treaty Series”. See https://treaties.un.org/doc/Publication/UNTS/Volume%20639/volume-639-A-6964-English_French.pdf

³⁹⁴ Bhabha, Homi. "Note, Homi Bhabha to Shri Y. D. Gundevia", September 2, 1960, Wilson Center Digital Archive, National Archives of India, Prime Minister's Office, File No. 17(1773)/76, "Biography of Homi Bhabha." Obtained by Vivek Prahladan.

CIA documents argued that Indian scientific centers could assemble rudimentary Pu²³⁹ explosive devices in 1965 (a year after Nehru's death) – that is, these studies existed³⁹⁵.

So, a subject that strengthened ties among scientists and policymakers was the search for a self-sufficient mechanism to produce indigenously nuclear fuel (ABRAHAM, 1998). It came from the need to overcome colonial hurts and avoid possible international pressures since great powers started to discuss the nonproliferation regime's bases considering the internationalization of raw material sources via the Baruch Plan in 1946.

Although attaining complete autonomy to sustain a nuclear program sounded like a herculean task, scientists relied on this objective to robust their influence over the policymaking process (see Frey 2004) – since politicians held these ambitions to achieve the status of great power and anticolonial mindset (see Abraham 1992). In this sense, these two groups agreed in creating the DEA (1954) to coordinate the national nuclear policy to harness these technologies for civilian purposes and possible warlike researches. Therefore, political support is not a problem for scientific indigenous initiatives – for example, the nuclear program absorbed about 25% of the whole S&T budget in India during the 1960. This amount decreased in 1970s due to the boost on space program's studies – which were linked to the atomic-related initiative (HART, 2019).

Therefore, Bhabha drew a nuclear strategy focusing on two fields: (a) incentivizing the Indian nuclear industry to produce cutting-edge technologies during the 1950s (e.g., nuclear reactors) and (b) defining a plan that reduced the reliance on foreign assistance and raw materials. At that time, India was concerned about the need for uranium since this element was not abundant nationally³⁹⁶ (BHABHA; PRASAD, 1959) – unlike thorium. Bhabha envisaged, in 1954, a nuclear project based upon three stages, where the last phase aimed to employ thorium as the raw material for generating electricity. This process would gradually come into being. Indian scientists concluded that employing thorium would reduce the dependence on enriched uranium (see Vijayan et al. 2017) – which technology was in the United States during the 1950s.

³⁹⁵ United States. CIA. 1965. "India's Nuclear Weapon Policy – Special National Intelligence Estimate Number 31-1-65. Supersedes Memorandum to Holders of NIE 4-2-64 and NIE 31-64". [Secret]. https://www.cia.gov/readingroom/docs/DOC_0000594950.pdf

³⁹⁶ In 1949, India established a state initiative to explore minerals sources. The goal was to find as many possible sources of zirconium, thorium, and uranium, but it did not obtain massive amounts of the latter. The UCIL started to work in 1967 to process the necessary material to use in reactors that employed natural uranium – as Gopalakrishnan (2002) remembered, there was only a pilot-scale fuel element fabrication plant before placed in Trombay.

In conclusion, the three-stage nuclear power program consisted of (1) the initial employment of natural uranium dioxide in PHWRs – a technology³⁹⁷ that did not demand such sophisticated and expensive techniques observed in PWRs to produce them nationally. This chemical process generates energy and Pu²³⁹ (usually used in military-led projects). (2) Machines would reprocess this fuel to obtain the necessary Pu²³⁹ to produce a mixed oxide fuel with depleted uranium. It would be employed in FBRs to breed fuel (BANERJEE; GUPTA, 2017) . In contact with a thorium-loaded blanket region, these elements produce the U²³³. (3) The ultimate aim was to design cutting-edge technologies (thermal breeder reactors) to make these machines produce more fuel material than burn – ensuring the sustainability of the project and the independence of imported uranium (GOPALAKRISHNAN, 2002).

By embracing this task of attaining self-sufficiency in nuclear technologies, New Delhi created a big scientific complex in Trombay in 1957 - named BARC in 1966. It comprised scientific initiatives to build reactors (e.g., PHWR capable of using as fuel a mix of 0.7% U²³⁵ and 99.3% U²³⁸) in the country, train workers, and radioactive waste management. To do so, scientists realized India had a scarce capability to build a nuclear program without external assistance during the 1950s. Hence, policymakers attempt to search for foreign partners and acquire technologies while they advance in national studies. As demonstrated, the period from the 1950s to the 1960s was marked by a spread of nuclear technologies from great powers while the regulating rules and networks were under discussion – see, for example, the case of Atoms for Peace. It is crucial to bear in mind that scientists not to spoil the plans of attaining nuclear autonomy and disappoint nationalist sectors put this initial dependence on foreign technologies under secrecy (ABRAHAM, 1992; FREY, 2004).

India took advantage of these initiatives to establish the first stage of its long-run S&T strategy. National scientists and policymakers conveyed worldwide that India developed a robust nuclear program – one of the most advanced in the Third World. The prominent role in the negotiation of the IAEA statute and the personal linkages between Indian scientists with great powers' universities and scholars encouraged multinational companies to approach India's research centers and institutions to provide sensitive technologies (Sarkar 2022).

³⁹⁷ Over this topic, I would like to emphasize the following citation from an IAEA's document explaining the reasoning behind this choice: "India has chosen the Pressurised Heavy Water type reactors (PHWR) for its first stage of nuclear power programme. Because of its excellent neutron economy this type of reactor produces maximum-amount of plutonium which is so vital for sustaining a sizable breeder programme during the subsequent stages, with the ultimate aim of thorium utilisation. Apart from fuel cycle aspects, the adaptability of this system for indigenous manufacture and use of indigenously available nuclear materials have been other considerations for choice of this system" (Mehta et al. 1977, 1).

Furthermore, companies from the United States played an important role on pressuring to enter the Asian market – a variable that previous literature delved into (see Teixeira and Gabriel 2022).

Bhabha, in so being, pushed for the built of the reactor ASPARA in 1956, the first research reactor in Asia (outside the URSS) to achieve critically. This pool type reactor of 1MW power was assembled and built in India with assistance of foreign agents (e.g., the fuel element was provided by London) – despite being the first trophy of New Delhi to demonstrate its capabilities in mastering nuclear technologies (SARKAR, 2022). As Nehru claimed during the inauguration of this reactor: “[W]e are not reluctant in the slightest degree to take advice and help from other countries. We are grateful to them for the help which they have given—and which we hope to get in future—because of their long experience³⁹⁸”.

During the 1950s, India looked for closer ties with France³⁹⁹ and Canada (PERKOVICH, 2001) to construct reactors and nuclear facilities⁴⁰⁰, the United Kingdom to provide technical support and heavy water, and tried to explore Cold War nuclear assistance programs (MISHRA, 2018) – especially the Atoms for Peace and the Colombo Plan of 1951 (SARKAR, 2022). For instance, Indian innovating initiative to build fast reactors at the BARC received endorsement for France as well as the establishment of the IGCAR (RAMANA, 2009). Nonetheless, this network was not restrict to these countries since New Delhi tried, for example, to find initial support from Latin American countries (see Joshi 2018). Likewise, India obtained aid from Moscow to build the fast neutron reactor, PURNIMA, in 1968. Its design hinged on the Soviet IBR-30 (IYENGAR et al., 1974).

India was able to foment the first stage by receiving an international endorsement at this moment. It obtained a credit from the United States to purchase two BWRs that started their commercial operation in 1969 (among the first nuclear power plants in the Third World). These

³⁹⁸ Hindustan Times. 1957. “Nehru inaugurates India’s first reactor; peaceful uses only objective, says PM”. See: <https://www.hindustantimes.com/india-news/hthisday-january-21-1957-nehru-inaugurates-india-s-first-reactor-peaceful-uses-only-objective-says-pm-101642680570965.html>

³⁹⁹ France. "French Foreign Ministry, Note on Indian Foreign Policy and Franco-Indian Relations", February 1, 1955, Wilson Center Digital Archive, Archives des Ministère des Affaires Etrangères, La Courneuve, Carton 65, Inde : Relations avec la France, 1944-72. Obtained for NPIHP by Jayita Sarkar. <https://digitalarchive.wilsoncenter.org/document/117751>

⁴⁰⁰ The United Kingdom. "Letter from the French Foreign Ministry to the UK Embassy in Paris on the Franco-Indian Reactor Agreement", August 24, 1951, Wilson Center Digital Archive, Archives des Ministère des Affaires Etrangères, La Courneuve, AB16/565, Technical cooperation with India, 1947-54. Obtained for NPIHP by Jayita Sarkar. <https://digitalarchive.wilsoncenter.org/document/117746>

reactors in Tarapur assumed a crucial role in the initial nuclear program, but they came from turnkey agreements with the General Electric⁴⁰¹. Although these machines were not part of the three-stage program, scientist preferred acquiring the cheapest technology to produce nuclear energy while they learn how to master cutting-edge elements, as Ramanna (1987, 214) stated:

Even though this type of reactor did not fit in with our long term three stage strategy, the Government nonetheless decided to purchase the Tarapur reactors on a turn-key basis from GE in order to bring the benefits of nuclear power to the country as early as possible and to give an opportunity to Indian scientists and engineers to gain experience in building and operating a nuclear power station in an Indian environment-particularly in our relatively small electrical grid systems.

In the same decade, Washington helped Indian scientists to construct the thermal reactor ZERLINA by furnishing heavy water to moderate the operation (see Rastogi and Srinivasan 1963). Bhabha promoted a robust scientific link with Canadian scholarly groups, which provided technical assistance to build the CIRUS reactor – moderated by heavy-water from the United States in 1964⁴⁰², although Indian achieved the goal of leaving this research reactor outside IAEA’s safeguard programs (since they were not in vogue, only bilateral mechanisms were negotiated⁴⁰³). This inter-governmental project had been negotiated since 1950s, as Bhabha argued; however, it was not an initiative from the Colombo Plan – but part of Indian strategy to find new partners:

Certain points need to be clarified regarding the Canadian-Indian Reactor Project, and how it is to be handled at the Inter-Governmental level. This Project is not a normal Colombo Plan project. In fact it started outside the Colombo Plan in the course of correspondence between the Prime Ministers of Canada and India, and was brought to fruition in the course of discussions in Geneva in August last year between the scientists of Atomic Energy of Canada Limited and of this Department. The approval of the Government of India to the financial commitments involved was obtained directly through your orders- it was made clear to me by the Secretary of the Department of Finance of the Canadian Government, when I visited Ottawa last year, that the Canadian financial allocation for this plan would be outside the normal Colombo Plan funds and this has been stated in the correspondence on the file⁴⁰⁴.

It is a crucial aspect of Indian nuclear history because the country pragmatically applied foreign-made technologies to complement the work of national scientific initiatives. As I presented in section 7.2, India tried to avoid international pressures over its nuclear facilities.

⁴⁰¹ India organized a global tender joined by enterprises from the United Kingdom and France. New Delhi preferred to accept the offer from the United States that employed enriched uranium.

⁴⁰² The CIRUS reactor motivated Indian scientists to settle a heavy water plant that commenced operation in 1962 at Nangal. See: United States. CIA. 1956. “Proposed Fertilizer and Heavy Water Plant for Bhakra-Nangal Project”. [17th April, 1956] – Confidential. https://www.cia.gov/readingroom/docs/DOC_0000526248.pdf

⁴⁰³ More details at section 7.2. Actually, official documents from the United States argued that these bilateral sanctions were not able to check whether plutonium produced by the CIRUS were diverted to military-led purposes. See: United States. Department of State. 1968. Telegram Amembassy Ottawa [Secret] – Indian Nuclear Program. In: National Security Archive. RG 59, Subject-Numeric Files, 1967-1969, box 870, FSE India 13; DNSA.

⁴⁰⁴ Bhabha. Homi. 1956. “Mode of dealing with the Canadian-Indian Reactor Project”. April 16, 1956. In: The Department of Atomic Energy. The architects of atomic energy programme in India. 2008.

New Delhi promoted a model of advancing national scientists' skills domestically to master sensitive technologies. By following a long-term S&T program and avoiding external influence, the elite that took over decisions on the nuclear field organized this plan according to the original strategy of obtaining self-sufficiency/autonomy. It contrasts with Brazilian experience that acquired foreign assistance imagining leapfrogging nuclear development while not investing in S&T national projects. Such an Indian thinking was summarized in an article published by the IAEA:

We had realized that the superimposition of advanced technology obtained from abroad does not imply progress in the real sense - it only creates illusions of progress. We recognized at an early stage of development that, due to these and various other factors, the most important task for the introduction of nuclear technology in India was to establish a cadre of scientists and engineers and generate interaction among various scientific disciplines and, at an appropriate stage, translate this interaction into concrete projects⁴⁰⁵.

New Delhi consolidated a robust nuclear industry. CIRUS reactor was able to produce plutonium as a by-product. Hence, India advanced to join the group of a few countries capable of reprocessing nuclear fuel. By creating Project Phoenix⁴⁰⁶, India settled a plant using the design of a PUREX facility in 1959, from the United States enterprise Vitro Corporation, to separate and reprocess materials obtained by the CIRUS reactor. Indian scientists learned with this process to robust their knowledge about atomic engineering (SARKAR, 2022). In this sense, this S&T development was boosted also by geopolitical factors since China became a nuclear power in 1964 through the test at the Lop Nur site. Local policymakers assumed a necessity to respond to this possible competition with a country that waged a territorial war with New Delhi in 1962 (Joshi 2018). Indeed, Indian documents claimed local policymakers observed with a certain admiration the capability of a country defy international rules:

The immediate consequences of these symbolic explosions are obviously in the field of international relations. The fact that self-reliant China, after her break with Russia, should have made this breakthrough will immensely bolster her Afro-Asian diplomacy. China no longer belongs, as it were, to the poor nations, but to the group of technologically advanced countries. She can assert with greater confidence that since the conditions in China were similar to those of other emerging countries, her experience and achievement prove that she is worthy to lead and chart the course for the developing south of the world⁴⁰⁷.

As long as Indian scientists promised that New Delhi could consolidate a full-fledged nuclear policy, the rise of China pressured them to provide outcomes due to technological

⁴⁰⁵ (see Sethna 1979).

⁴⁰⁶ Nehru authorized a scientific project to establish a reprocessing plant to match the capacity of elements produced by the CIRUS reactor (FUHRMANN, 2009).

⁴⁰⁷ India. 1964. "J.S. Mehta, 'China's Bomb and Its Consequences on her Nuclear and Political Strategy'", October 19, 1964, Wilson Center Digital Archive, National Archives of India, Ministry of External Affairs, File No. HI/1012(14)/64-I & II, "Monthly Political Report from Peking." Obtained by Vivek Prahaldan. <https://digitalarchive.wilsoncenter.org/document/165246>

competition and, posteriorly, warlike topic (Joshi 2022). Likewise, wars against Pakistan (1965 and 1971) pressured Indian policymakers to assume a more assertive position on defensive instances. The then-Prime Minister of Pakistan in 1965, Zulfikar Ali Bhutto, promised Islamabad would catch up with Indian nuclear development by telling people that the country would eat grass or leaves, but it would acquire an atomic weapon (see Khan 2020). This growing tension in Asia dented the interests of Indian policymakers to advance in the nuclear program for even defensive purposes, as the United States intelligence observed:

With China at her back and Pakistan lurking on the sidelines, she foresaw no alternative but to keep open her option on the production of nuclear weapons. She emphasized the policy of the Government of India remained one devoting its nuclear resources solely to peaceful uses. But who could foresee when it might become necessary to change this policy?⁴⁰⁸

This context catalyzed the S&T development in India in fields related to nuclear policy. India's space program was established during the Cold War (Rajagopalan 2011) at the IISc and drew close partnerships with the atomic program – since the leaders from both projects were the same. After Bhabha's death (1966), Vikram Sarabhai assumed the head of Indian atomic agencies and the ISRO. In so being, DAE used the rocket launch site in Thumba during the 1960s to diversify its technological knowledge and commercial links – this place was used by countries like the Soviet Union, the United States, West Germany (SARKAR, 2022). The possible use of space program's technologies to carry nuclear weapons (e.g., the rocketry program) certainly called attention of great powers (section 7.2), but it represented a mechanisms to refine the available indigenous capability of India to develop a robust nuclear project – even for military-led purposes.

Due to this context, ISRO⁴⁰⁹ similarly aimed to reduce reliance on imports and persuade domestic firms and national research centers to undertake envisaged projects. It enabled the Indian nuclear program to enjoy a missile-guided development program, consolidated during the 1980s, that produced a mechanism to carry atomic bombs. Hence, the nuclear program worked in tandem with the scientific development of India by encouraging indigenous scientific projects (see Pande 1999).

⁴⁰⁸ United States. 1967. Department of State. Telegram [Amembassy New Delhi]. In: National Security Archive. RG 59, Subject-Numeric Files, 1967-1969, file FSE India 13. See <https://nsarchive2.gwu.edu/nukevault/ebb253/doc07.pdf>

⁴⁰⁹ It is worthwhile to mention that I emphasize the role of ISRO during this context because it represents an S&T project closely linked to the nuclear program due to the missile/rocketry initiative. As Sarkar (2022, p.201) pointed out: “[N]uclear, space, and defense technologies became more closely integrated in India during the 1980s than ever before”.

These aspects are crucial to understand the Indian S&T development. Even after the Nehru's (1964) or Bhabha's death, New Delhi kept the plan of sustaining a long-lasting initiative to attain self-sufficient in the nuclear field. The three-stage program was kept, as well as, the prevalence of scientists in the policymaking process. "Big science" goals became mores bulwarks of Indian mission to overcome underdevelopment and structural problems, such as the Green⁴¹⁰ and White Revolution during the 1960s. It promoted the growth of national food production via agricultural studies not to depend on foreign aid. Therefore, this context demonstrated that the scientific community consolidate the image a crucial elite to make India a great power (AHMAD, 1985) – although political actors detained the last word on decisions like conducting a nuclear explosion (see Perkovich 2001).

In this sense, I would like to pinpoint four topics that composed the nuclear history in India based upon these pillars: anticolonialism, desire for self-sufficiency, valorization of a scientific elite, and political ambitions on S&T. Firstly, the convergence between these elements influenced the relationship with the nonproliferation regime. India refused to join the NPT since it could hamper the S&T long-term plan to indigenously robust its nuclear industry. Since this objective was crucial to Indian policymakers' mindset, the refusal to adhere to global rules encouraged the promotion of scientific aims domestically.

The restriction on nuclear trade and the conditions imposed to delivery foreign aid, boosted the interest of Indian policymakers to attained an autonomy on technological production – like reactors. As the BARC director told in 2001: "[w]e are really comfortable when we work under sanctions. Our scientists and engineers enjoy working under sanctions because it acts as a catalyst for all of us, from the lowest level to the topmost level, to give our best⁴¹¹". An example that India was able to overcome international pressures on S&T is that it commissioned nuclear reactors during the 1980s – even after the application of nonproliferation rules (Frey 2004).

In so being, Table 11 corroborates with this argument by demonstrating that the Indian nuclear industry started to produce indigenously atomic-related technologies during the Cold

⁴¹⁰ I intend to address a subject related to this period. New Delhi encouraged these revolutions on S&T topics to reduce the dependence on foreign aid and overcome social problems such as the rampant famine at that time – when analysts freaked up about the arguable Malthusian dilemma. During the Vietnam War, India opposed the Washington policy. It led the White House to hold back wheat shipment to New Delhi. It was not an indirect way to affect the nuclear program, but it was one of the most famous examples of how great powers tried to influence Indian policies (SARKAR, 2022). For more details, see: (CLEAVER, 1972)

⁴¹¹ Bhattacharjee, B. (2001). "Sanctions act as catalyst": Interview with B. Bhattacharjee, Director, Bhabha atomic Research Centre," *Frontline*. November 24. See: <https://frontline.thehindu.com/other/article30252740.ece>

War to generate energy (bigger than simple research reactors). This table enlists the nuclear reactors for producing electrical power operating in India during the analyzed period and their origin:

Table 11 – Nuclear reactors in India for generating energy

Name	Type	Year of Criticality	Origin
TAPS-1	BWR	1969	United States
TAPS-2	BWR	1969	United States
RAPS-1	PHWR	1972	Canada
RAPS-2	PHWR	1981	Canada
MAPS-1	PHWR	1984	India
MAPS-2	PHWR	1986	India
NAPS-1	PHWR	1991	India

Source: own elaboration employing data from Gopalakrishnan (2002)

Table 11 demonstrates that India became a supplier of nuclear technologies for its domestic market. More than reactors, Indian agencies became able to commission reprocessing plant in 1978 by establishing the second facility in the country (RAMANA, 2009). Another example that will be addressed in the next section was triggered by the sanctions from Canada that left the project of RAPS-1 unfinished in 1974.

India employed its sources and own efforts to accomplished this objective to produce a nuclear reactor. In this sense, other countries sought its support since New Delhi represented a potential partner for other Third World states that refused to abide by the nonproliferation rules in vogue and had developed a sophisticated nuclear program. Argentina⁴¹², Colombia, Saudi Arabia, Egypt⁴¹³, Yugoslavia, South Korea, Libya, Peru, and Brazil cozied promising scientific ties with India to receive technological assistance at a moment when export controls were established (Joshi 2018).

Indeed, Brazilian authorities showed admiration⁴¹⁴ for how India encouraged the production of indigenous-led sensitive technologies (e.g., by choosing foreign assistance that

⁴¹² Indian congresspeople raised the suspicious that New Delhi was building a reprocessing plant in Argentina in 1974. See India. 1974. "Rajya Sabha Q&A on Indian Construction of an Argentinian Nuclear Power Plant.", December 19, 1974, Wilson Center Digital Archive, Institute for Defence Studies and Analyses (ISDA), Rajya Sabha Q&A Documents. <https://digitalarchive.wilsoncenter.org/document/119726>

⁴¹³ I will deal with Egyptian case more in-depth in the next subsection about the ways employed to enforce nonproliferation rules in India.

⁴¹⁴ CNEN. 1974. "A Energia Nuclear na Índia". In: CNEN archives.

bring technologies that could be emulated), despite facing international pressures⁴¹⁵. Documents argued Brazil considered India an example to undertake researches on SFRs with France⁴¹⁶. Likewise, New Delhi tried to promote commercial and scientific ties with Tripoli by encouraging this African newly born atomic program (1970) to employ techniques of desalinization via nuclear energy (Sarkar 2022).

Indian interests to attain nuclear autonomy by establishing an indigenous-led program became clear during the 1974 peaceful nuclear test. New Delhi, ruled by Indira Gandhi, authorized scientists (e.g., Raja Ramanna) to conduct an underground explosion in the region of Rajasthan after a period of studies about the costs and environmental impacts⁴¹⁷. It represented a possible manner to demonstrate international mechanisms would not impose critical hurdles to the Indian aim in becoming an S&T power. As the United States intelligence argue, India had attained a robust technological development and could have tried to show their prowess through this test⁴¹⁸. In a moment when great powers discussed the revision of the NPT, Indian policymakers attempted to advance on nuclear-related studies. Furthermore, the tests in 1974 might have demonstrated to the United States that India had national capabilities to protect local governments from *coupe d'états* like what happened in Chile in 1973^{419,420} (Joshi 2018).

⁴¹⁵ CNEN. 1968. "Ata da Duocentésima Nonagésima Sétima (297ª) sessão da comissão deliberativa da comissão nacional de energia nuclear, realizada em 17 de abril de 1968, terça-feira, com início às 16:00 horas" [confidencial]. In: CNEN archives. <http://memoria.cnen.gov.br/memoria/exibeAta.asp?codigo=297>

⁴¹⁶ Brazil. 1975. "Reatores Rápidos a Sódio". In: CPDOC-FGV. Paulo Nogueira Batista's archive.

⁴¹⁷ India. 1973. "Rajya Sabha Q&A on Underground Nuclear Tests", August 2, 1973, Wilson Center Digital Archive, Institute for Defence Studies and Analyses (ISDA), Rajya Sabha Q&A Documents. <https://digitalarchive.wilsoncenter.org/document/119737>

⁴¹⁸ United States. 1974. "US Embassy India Cable 6598 to State Department, 'India's Nuclear Explosion: Why Now?'" , May 18, 1974, Wilson Center Digital Archive, Access to Archival Databases (AAD), National Archives and Records Administration, Record Group 59, Central Foreign Policy File, document number 1974NEWDE06598. Obtained and contributed by William Burr and included in NPIHP Research Update #4. <https://digitalarchive.wilsoncenter.org/document/113911>

⁴¹⁹ India. 1973. "Telegram from G.L. Malik, Indian Ambassador to Chile, 'The Internal Situation in Chile'", November 22, 1973, Wilson Center Digital Archive, No: SANT/101/3/73. Obtained by Ryan Musto. <https://digitalarchive.wilsoncenter.org/document/133969>. This topic was raised during the interview with Joshi (2023).

⁴²⁰ Over this topic, I am thankful for Dr. Joshi who raised this issue during our interview. In fact, I became curious to delve into this link between the overthrow of Allende through a coup orchestrated by Chilean military forces and the CIA. I found some interesting sources about how Indira Gandhi often used this event during her speeches in 1974. She stated many times that her government faced menaces from outside groups – the coup in Santiago was employed a proof that the United States attempted to influence overseas domestic politics. Some Indian diplomats stated that there was, indeed, a link between conducting a nuclear test and the idea of preserve national sovereignty against foreign groups. See more Das, Debak. 2019. "Leaked Cables: Allende, Kissinger, Moynihan, and the Indian Nuclear Bomb". In: Wilson Center Institute archive. <https://www.wilsoncenter.org/blog-post/leaked-cables-allende-kissinger-moynihan-and-the-indian-nuclear-bomb>

Likewise, the Italian diplomacy argued that India performed this test to reinforce its independence from Cold War geopolitical poles, including Moscow⁴²¹.

This experiment only employed material and equipment from India. The implosion mechanism consisted of plutonium produced by the CIRUS reactor. Indian scientists at Trombay assembled it. It was considered an accomplishment for the country, according to Indira Gandhi⁴²². She also claimed other Third World states would welcome this test (see more in section 7.2.2) – it is worthwhile to bear in mind that Brazil, for example, advocated for the right to conduct these experiments⁴²³. In conclusion, this test sparked national pride, a source of scientific prestige⁴²⁴ that confirmed the role of scholars on conveying India as a great power (Frey 2004). As a United States document argued: “India’s purpose in developing nuclear capability seen as means to increase its prestige, power, and influence, the objective being hegemony in subcontinent⁴²⁵”.

Hence, the peaceful nuclear explosion (so-called “Smiling Buddha”) was motivated by a sense that India would be a great power who could attain nuclear self-sufficiency and thereby use S&T to safeguard its sovereign rights. It represented the idea of anticolonialism since India did not agree with nonproliferation rules based on great powers’ understandings that hampered the S&T development in other states:

[U]nfortunately, the NPT as it emerged in 1968, is an unequal and discriminatory treaty, as it only seeks to prevent a further increase in the number of nuclear-weapon Powers without placing any curbs on the ever-growing and more destructive nuclear weapon stockpiles of existing nuclear-weapon states. The treaty places all obligations on non-nuclear-weapon states without any binding commitments whatsoever on the nuclear-weapon States. The treaty imposes international safeguards on the peaceful nuclear activities of non-nuclear-weapon States only, without any such safeguards on the nuclear activities, whether civil or military, of nuclear-weapon States. The Treaty also prohibits only the non-nuclear weapon States from conducting nuclear explosions for peaceful purposes⁴²⁶.

⁴²¹ Italy. 1974. “MAE Report on Indian Nuclear Explosion”, September 2, 1974, Wilson Center Digital Archive, Istituto Luigi Sturzo, Archivio Giulio Andreotti, Box 1499, Subseries -N/A, Folder 1.

<https://digitalarchive.wilsoncenter.org/document/188008>

⁴²² India. 1974. “Statement Re. Underground Nuclear Explosion Experiment. [22-07-1974]” See:

https://eparlib.nic.in/bitstream/123456789/800804/1/pms_05_11_22-07-1974.pdf

⁴²³ Non-Aligned Group. 1967. “25th Meeting of Non-Aligned Group with Discussion on Peaceful Nuclear Explosions”, November 7, 1967, Wilson Center Digital Archive, File No. HI/1012(48)/67. Obtained by Ryan Musto. <https://digitalarchive.wilsoncenter.org/document/133990>

⁴²⁴ Ramanna, Raja. 1987. “Interview: War and Peace in the Nuclear Age; Haves and Have-Nots; Interview with Raja Ramanna, 1987”. War and Peace in the Nuclear Age. https://openvault.wgbh.org/catalog/V_4B6BFC12257C4824A1848B5A22285EED

⁴²⁵ United States. DoS. 1974. “Indian Explosion of Nuclear Device Has Had Profound Effect on Pakistan, both in terms of Heightened Public Sense of Insecurity and Challenge to govt Goal of Limited Official Use”. In: National Archive. Central Foreign Policy File (CFPF), 1973-1979.

⁴²⁶ India. 1976. “Ministry of External Affairs, Africa Division, ‘Disarmament and Nuclear Energy’”, December 22, 1976, Wilson Center Digital Archive, PN Haksar Papers, Subject File No. 89 <https://digitalarchive.wilsoncenter.org/document/133993>

To reinforce this anticolonial dimension, I would summarize this topic by citing Frey (2009, 203) who addressed the relevance of anticolonialism to inspire India in this nuclear test and promote a persistent policy in this field:

Postcolonial identities tend to add strong feelings of humiliation and pride to the definition of the us-against-them antagonism and to strongly impact the collective sense of sovereignty. This mindset clashes with an international nuclear order maintained by former colonial powers or their perceived successors that claim supremacy through an inequitable treaty imposed by a safeguard regime often perceived to violate the sense of sovereignty and national dignity defined by postcolonial states. The strong sense of sovereignty that postcolonial states display, and their search for the “right place at the table” in the international arena, often translates into a strong sense of national prestige and status, both crucial for the emergence of the nuclear myth.

In the same way, documents from the CIA argue that India would employ its image of a Third World leader to safeguard national S&T interests. For example, New Delhi could mobilize the G77, a coalition composed of Third World countries in the UN, to pressure NWSs to strengthen their commitments to nuclear disarmament and reinforce Indian leadership among these countries. CIA’s opinion was that India would sustain a prominent role in the coordination of the non-aligned movements’ S&T vision to promote its national interests and establish a nuclear export market among Third World countries⁴²⁷. For instance, India joined many nuclear proliferation discussions raising arguably question that concern Third World interests, like in 1956 when it submitted a memorandum suggesting transparency on military budgets to make other countries aware of which great powers was investing in weapons of mass destruction⁴²⁸.

India sustained that it had only peaceful nuclear ambitions, although some scientists wanted the states to assume the intention of building atomic weapons. As I mentioned before, these pillars underpinned Indian nuclear history and the peaceful-led nuclear ambition became a kind of mantra of Indian leaders – repeated by Indira Gandhi⁴²⁹, Rajiv Gandhi and so on. It is worthwhile to bear in mind that even the Indian Congress Party’s opposition sustained this moral discourse against nuclear weapons, as noticed in Vajpayee speech in 1978:

In the field of nuclear disarmament India has already set an example by unilaterally renouncing the manufacture of nuclear weapons. It is our solemn policy to develop nuclear technology only and

⁴²⁷ United States. CIA. 1980. “Indian Nuclear Policies in the 1980s (u): An Intelligence Assessment”. Withheld under statutory authority of the Central Intelligence Agency Act of 1949 (50 U.S.C., section 3507). See <https://www.archives.gov/files/declassification/iscap/pdf/2012-062-doc01.pdf>.

⁴²⁸ India. 1963. “Report on Indian Foreign Policy and Nuclear Disarmament”, 1963, Wilson Center Digital Archive, File No. U.IV.2540/21/64, Notes on “India and Disarmament” and “India and the UN Peacekeeping Machinery.” Obtained by Ryan Musto.

<https://digitalarchive.wilsoncenter.org/document/123912>

⁴²⁹ India. 1967. “Rajya Sabha Debate on the Non-Proliferation Treaty”, November 21, 1967, Wilson Center Digital Archive, Institute for Defence Studies and Analyses (ISDA), Rajya Sabha Q&A Documents. <https://digitalarchive.wilsoncenter.org/document/11976>

exclusively for peaceful purposes. It is, therefore, a little surprising that the issue should be sought to be confused by making appeals to India on this question⁴³⁰.

This morality in the Indian speech on nonproliferation persisted in an anticolonial sense. This is, therefore, the second topic that I would raise to explain Indian nuclear history. India conveyed it was a leader against nuclear proliferation, but it was a great power representing the S&T development in the Third World. New Delhi reinforced the idea that it carried S&T programs only to promote national development. This dichotomy between a moral leader and the sense of great power persisted during the analyzed period. Whereas it advanced on nuclear studies, India argued that the nonproliferation regime was an unbearable burden for national scientific initiatives. For example, the then-Prime Minister Rajiv Gandhi proposed in 1988⁴³¹ a nonproliferation plan to avoid atomic menaces and strength export controls without arguably discriminatory instances. Meanwhile, the Indian leader discussed with other countries that possibility to provide assistance for national project of building a nuclear-powered submarine⁴³².

The third topic is that policymakers endorsed the S&T development of India – mainly in the “Big Science” field. Indira Gandhi⁴³³ made speeches praising the role played by scientists to promote the development of the country. Although politicians had the final word in sensitive decisions (e.g., conducting a nuclear explosion), scientists were key agents to define the S&T policy. I need to emphasize that Prime Ministers did not let scientists to carry any sort of experiments according to their interests – e.g., Indira Gandhi refused the proposal to authorize the development of nuclear warheads in 1982. Yet, the scientist elite still played a relevant role since other agents arose as leaders of this group – for example, Rajagopala Chidambaram who coordinated Indian nuclear efforts during the 1990s.

This is the fourth topic: scientists sustained a highlighted position within this context. This closed group of scientific elite moved pragmatically to maintain their privileged instance by

⁴³⁰ Vajpayee, Atal Bihari. 1978. “Changing International Order and India’s Role in it”. Osmania Univeristy and the Administrative Staff College of India in Hyderabad. In: Foreign Affairs Record MEA India. See <https://mealib.nic.in/?pdf2566?000>

⁴³¹ India. 2013. Statement by H.E. Mr. Salman Khurshid Minister of External Affairs of India at the High level Meeting of the General Assembly on Nuclear Disarmament 68th United Nations General Assembly. (September 26, 2013). See: https://www.un.org/en/ga/68/meetings/nucleardisarmament/pdf/IN_en.pdf

⁴³²India. 1989. "Letter from Rajiv Gandhi to M. S. Gorbachev (Edited)", October 27, 1989, Wilson Center Digital Archive, Vitalii Leonidovich Kataev Papers, Box 13-14, Hoover Institution Archives. <https://digitalarchive.wilsoncenter.org/document/134411>

⁴³³ India. 1968. "Speech by Prime Minister Indira Gandhi", November 9, 1968, Wilson Center Digital Archive, Institute for Defence Studies and Analyses (IDSA), Tata Institute of Fundamental Research, TFIR Documents, IDSA-TIFR-09111968. Obtained and contributed by A. Vinod Kumar and the Institute for Defence Studies and Analyses. <https://digitalarchive.wilsoncenter.org/document/114196>

diversifying their projects to military-led aims or desalinization of water and justifying the allocation of budget (ABRAHAM, 1992). As Sarkar (2022) noticed, India attempted to reduce tensions with great powers during 1980s – mainly because Reagan’s administration opened a negotiating door with New Delhi by relaxing the tough nonproliferation policy applied during Carter’s administration. In this sense, India started to invest on military-led equipment by acquiring weapons and modernizing the air force with Western technologies – for example, the Jaguars nuclear-capable plans.

Since their interests converged with politicians, divergent opinions were left aside or domestically stigmatized. An interesting example was when some Indian scientists accepted to put the reactor RAPS-1 under IAEA safeguard system in 1966 and politicians criticized this decision as an abdication of the national sovereignty (Sarkar 2022). Although Indian society discussed the national nuclear program and its costs, New Delhi preserved the ambition to attain the three-stage program (SARKAR, 2022). Financial crises worsened local capacities to invest in uranium mining, but it sustained the idea of working with thorium and developing FBRs.

In conclusion, I would like to share a data to demonstrate how advanced became India in the nuclear field during the end of the Cold War vis-à-vis other Third World countries. The 1995 SIPRI yearbook, just four years after the Cold War, published the capacity of each country to master civil plutonium separation techniques. India was the only country from the Third World to work with this technology. Likewise, it was already developing fast reactors – a machine that only NWSs, Germany, Italy, and Japan were dealing with during that time⁴³⁴.

The next section will describe the most important actions that the Middle Power Trap employed to make India renounce its deviant behavior. India resisted to adhere to the NPT and assumed a position of bargaining national support to the nonproliferation rules to assurances that its S&T policy could be accomplished. The next section pinpoints the direct and indirect ways applied against India through bilateral and multilateral mechanisms.

7.2. The Middle Power Trap in Action against India

India faced many challenges during its nuclear trajectory. Its reticence in adhering to nonproliferation pillars (e.g., the NPT) reduced incentives from other countries providing foreign assistance for India since export controls hung onto the confidence built over the

⁴³⁴ SIPRI. 1995. SIPRI Yearbook 1995: Armaments, Disarmament, and International Security. SIPRI: Sweden.

international regime. This deviant behavior sparked diplomatic pressures and mistrust over Indian interests in mastering nuclear technologies. Although the last section (section 7.1) demonstrated that local scientists worked to overcome hurdles, the Middle Power Trap reduced the pace of the nuclear program by hampering the building of facilities. It also elevated the costs to manufacture technologies since the sanctions reduced the offer of sensitive equipment and domestic companies did not proposed the best available prices in the market (see Mirchandani and Namboodiri 1981).

Thus, India went through hardships to overcome technological issues by enforcing domestic factories to produce sensitive equipment and materials. The most relevant example was the common technical issues related to turbine excessive vibrations in indigenous-made reactors or machines manufactured by national efforts during the 1980s – see the cases of MAPS-1 and RAPS-1 (GILL; SISODIA, 1989). RAPS-2 and MAPS-2 were shut down due to concerns triggered by oil leakage (RAMANA, 2009). Finally, there was a hydrogen leakage in the generator stator water system of MAPS-2 in 1991 (Ramana 2009). IAEA's documents attested to New Delhi's concerns on safety-related conditions by organizing task forces for proposing for ensuring better protection against incidents (AGARWAL, 1998).

New Delhi represents a shadow case for this study. The Middle Power Trap can operate differently from the Brazilian experience. Yet, many aspects reinforced that this causal mechanism comprises instruments that work according to a similar logic: great powers leading the pressure movement and convincing other agents to do the same – or pushing even harder. As I will point out, Canada – a traditional Middle Power – championed the respect for nonproliferation regime as a necessary condition to resume technological support for India. An official document from the United Kingdom corroborates that this case is interesting to describe in a study about the Middle Power Trap since great powers elaborated a number of possible multilateral and bilateral actions to cajole India to adhere to nonproliferation instruments during the 1970s. These activities mobilized the diplomatic role of traditional Middle Powers and a coordinated pressure from NWSs like the United Kingdom, France, the United States, and eventually the Soviet Union⁴³⁵. Therefore, I could not talk about the Middle Power Trap without depicting the case of India. As an analyst, I came across documents that attested to the clear presence of this mechanism during this context, like a 1974 United States Department of State

⁴³⁵ United Kingdom. 1972. "'Memorandum of Conversation, 'Indian Nuclear Developments'", September 21, 1972, Wilson Center Digital Archive, National Archives, Record Group 59, SN 70-73, Def 12 India. Obtained and contributed by William Burr and included in NPIHP Research Update #4. <https://digitalarchive.wilsoncenter.org/document/113906>

confidential telegram discussing Indian allegations that the White House was organizing an international resistance to retard India's nuclear development⁴³⁶.

This context, in this sense, became more relevant after the NPT entered into force. I divided this section into two subsections, similar to the Brazilian chapter. Nonetheless, I drew Table 12 that summarizes the direct and indirect ways employed to produce the envisaged outcome. As I pointed out, it facilitates the reading and better organizes the chapter. One caveat: as India works as the shadow case and other authors have already mapped its nuclear history, Table 12 pinpoints the fundamental elements found during the research. I did not propose a summarization of all sanctions elaborated against India – as done with the Brazilian case (Tables 7 and 8). Since this section revolves around a summary of Indian atomic studies, I prefer to highlight the relevant elements to this study (i.e., demonstrate that New Delhi coped with international pressures). In this sense, this table consists of the most important cases, according to the literature and interviews, which symbolizes mechanisms to pressure or punish India during the Cold War.

Table 12 – The Middle Power Trap in Action against India

Year	Cases	Country	Direct	Indirect
1963	The United States ⁴³⁷ wanted to prevent India for developing sources of plutonium production. It proposed the selling of light water reactors (BWR) supervised by bilateral safeguards and possible IAEA's agents (via a trilateral agreement). The aim was reducing Indian interests on natural uranium reactors that could produce Pu ²³⁹ .	The United States		X
1966	Canada pressured India to accept IAEA safeguards on the RAPS-1 reactor (a CANDU-type technology).	Canada	X	

⁴³⁶ United States. FM AMEMBASSY MOSCOW. 1974. "Nuclear-related exports to India". The National Archives. Central Foreign Policy Files, created 7/1/1973 - 12/31/1979, documenting the period ca. 1973 - 12/31/1979 - *Record Group 59*. See: The National Archives. Central Foreign Policy Files, created 7/1/1973 - 12/31/1979, documenting the period ca. 1973 - 12/31/1979 - *Record Group 59*. See <https://aad.archives.gov/aad/createpdf?rid=220047&dt=2474&dl=1345>

⁴³⁷ Some readers would raise the following question: why this sort of cooperation is considered a direct way of pressure in India and similar cases in Brazil, e.g., the acquisition of a nuclear reactor from the Westinghouse in 1971, would be an indirect way. The answer is: in India, this topic mobilized only the nuclear program. On the other hand, the Brazilian case hampered the development of S&T projects as a whole – the UFMG programs, for example.

1968	The Soviet Union, the United States, the United Kingdom and Canada pressured India to reconsider its position over the NPT in the ENDC.	The Soviet Union, the United States, the United Kingdom and Canada	X
1971-1972	The Canadian Prime Minister, Pierre Trudeau, advised Indira Gandhi against using Canada-made technologies to proceed with possible explosive test. Washington and London mobilized their intelligence services to understand the situation.	Canada, the United States and the United Kingdom	X
1972	Washington planned to use S&T cooperative ties to exert influence over Indian policies – such as nuclear issues.	The United States	X
1973	The United States and the United Kingdom pressured the West Germany to acquiesce to the Zangger committee rules. It aimed, inter alia, to curtail possible partnerships between Bonn and DAE over the constructions of heavy water plants.	The United States and the United Kingdom.	X
1974	Great powers fomented the creation of the NSG to propose universal rules on nuclear-related market. It established a list (INFCIRC/254) of sensitive technologies that could only be negotiated if states acquiesced to nonproliferation rules and IAEA's safeguards.	NWSs (not China), Canada, West Germany, and Japan.	X
1974	Countries started to shame India due to the nuclear test. The peaceful nuclear explosion triggered a stigmatization campaign led by the United States and followed by traditional Middle Powers like Sweden and Canada.	The United States, Canada, Japan, Australia, Pakistan, Sweden and other countries.	X
1974	Multiple countries terminated cooperation agreements with India due to the stigmatization of this country as a potential threat to global peace. It includes ties with Canada and, for example, the refuse of Brazilian diplomatic body to assume an assertive position in favor of India.	Multiple countries	X
1974	India could not ratified an agreement with Argentina due to the deteriorating of New Delhi's diplomatic ties with Washington and Ottawa. India	The United States and Canada	X

	decided not to engage in another provocative movement.			
1974-1975	France required national scientific centers to increase the commitment to nonproliferation rules. Paris demanded the renegotiation of its contracts with DAE and refused to finish a plant in Pakistan.	France	X	
1975	India preferred not to sign an S&T agreement with Peru due to the international pressures against its nuclear program.	Multiple countries		X
1976	Canada decided to abrogate all nuclear-related cooperative ties with India.	Canada	X	
1976	The Soviet Union assumed pro-NSG instances in its contract to supply India with heavy water.	The Soviet Union	X	
1977	India refused an initiative from the United States and the United Kingdom to facilitate its admission in the NSG. New Delhi complained it sought to move its S&T policy under international discipline.	The United States and the United Kingdom	X	
1978	The United States invoked the Section 3b of the Nuclear Non-Proliferation Act of 1978 to implement an embargo on the delivery of low-enriched uranium to the Tarapur Power Station.	The United States		X
1982	France accepted selling low-enriched uranium fuel for the Tarapur reactors, but Paris would receive all radioactive products in order to prevent its reprocessing.	France	X	
1985	Canadian companies created the Candu Owners Group to facilitate the cooperation and mutual assistance among owners of this technology. After the Cold War, it became a source of menace for India because Ottawa wanted to punish India by excluding it from this group.	Canada	X	
1985	Countries reinforced the stigma on India when it decided to vote against a Pakistani propose to establish a Nuclear-Weapons-Free Zone in South Asia.	Various countries		X
1990s	The United States imposed some specific embargos on the sale of cryogenic engines to the ISRO.	The United States		X

Source: own elaboration based upon the literature review and primary sources

As observed in Table 12, the Middle Power Trap worked against India by employing both direct and indirect ways. Like in the Brazilian case, the Middle Power Trap became effective during the 1970s, after the NPT's entry into force. Interestingly, traditional middle powers pressured India like or even more than the NWSs. Nuclear tests and defiance of the nonproliferation rules stormed Canada's nuclear ties with New Delhi. Likewise, I observed that even Brazil⁴³⁸ (an emerging regional power) refused to stand with India due to diplomatic concerns – in this sense; the Middle Power Trap imposed the image of a pariah in New Delhi by making other countries shun this peer. A Brazilian diplomatic document reinforced this context by stating that the country did not have any problem with New Delhi, but it preferred to diplomats had to be very circumspect in dealing with this topic in order to avoid taking sides in a global dispute against NWSs⁴³⁹.

Furthermore, NWSs applied more severe actions to cope with the Indian nuclear ambitions compared to the Brazilian case. Authors claimed the establishment of the NSG to strengthen export controls comprised a multilateral instrument to constrain India. Likewise, a Brazilian document argued that Mexico asked India to acquiesce to the Treaty of Tlatelolco's Additional Protocol II since it technically became an NWS, but New Delhi refused to engage in this diplomatic issue⁴⁴⁰. Hence, great powers attempted to mobilize international efforts to suffocate Indian nuclear program and make it abide by rules. Table 13, in this sense, summarizes the applied direct and indirect ways to detail them in the next two subsections:

Table 13 – The Middle Power Trap's strategies against India: direct and indirect ways:

Direct	Indirect
Sale embargos	Sale embargos to other S&T programs
Establishment of export control's rules	Stigmatization
Pressures on countries to prevent supplying India with nuclear sensitive technologies	Termination of S&T partnerships
Conditioning assistance to Indian adherence to nonproliferation rules	

⁴³⁸ I am thankful for André Motta, a close friend of mine, to call my attention to this topic. Brazil, in fact, performed a wish-wash diplomacy towards India, during this episode, regardless the national interest in conducting S&T experiments without international interference.

⁴³⁹ Brazil. Ministério das Relações Exteriores. 1974. "Informação para o Senhor Presidente da República: A experiência nuclear da Índia" [21st May 1974]. In: FGV-CPDOC. In: Paulo Nogueira Batista's archive.

⁴⁴⁰ Brazil. 1974. "Memorandum para o Sr. Secretário-Geral: Revisão do TNP. Entrevista do Embaixador da RFA com o Chefe do DEC". [Secreto]. In: CPDOC-FGV. Paulo Nogueira Batista's archives.

Sources: own elaboration

During the next two subsections, I will depict these findings observed in Tables 12 and 13. The idea is to give a broad sense about how the Middle Power Trap influenced the development of the Indian nuclear program. Firstly, I describe the direct ways and it follows by a depiction of the indirect ways. For methodological reasons, I must emphasize that the Middle Power Trap operates in causal process. Yet, this works in a different way from the Brazilian case. Although it is not a comparative analysis, this piece of evidence reinforces the hypothetical proposition.

7.2.1. Direct Ways

India faced different hardships in terms of receiving technical assistance from NWSs or traditional Middle Powers after confirming its interests of engaging in nuclear peaceful explosions. The United States, the United Kingdom and Canada became the most active agents in enforcing nonproliferation rules – mainly after the 1974 tests. Indeed, Canada assumed an outstanding role because it embarked in an assertive position against India, which had close nuclear and S&T ties due to trade deals and cooperative works.

Ottawa's intelligence alerted NWSs about Indian intentions of advancing in explosive studies during the 1960s⁴⁴¹ since New Delhi interpreted that it was licit detonating nuclear devices by employing materials generated from foreign-made reactors if the administration claimed they were peaceful-led experiments. It stormed the Canadian government because safeguard agreements with India over offered reactors and equipment were drew before the IAEA's system and, thereby, it was not possible to constrain New Delhi via institutional means because the AEC was responsible for the inspection of these technologies⁴⁴². In 1976, Canada decided to terminate all cooperative ties with India, and Pakistan, until these countries acquiesced to the NPT's rules and IAEA's safeguard systems. It represented, as already mentioned, a drawback for the development of Indian nuclear program since Canada helped to build reactors (KAPUR, 1978).

In so being, the direct ways applied to pressure India represented mechanisms to: (a) condition further assistances to more commitments with nonproliferation rules, (b) enforce that

⁴⁴¹ United States. 1968. "U.S. Embassy India telegram 16194 to State Department, "GOI Nuclear Program", 26 June 1968, Secret, Excised copy" In: National Security Archive. See <https://nsarchive.gwu.edu/document/29486-document-1-us-embassy-india-telegram-16194-state-department-goi-nuclear-program-26>

⁴⁴² Canada. 1960. "Memorandum of Conversation, "Safeguards", 26 April 1960. [Secret]". In: National Security Archive. See <https://nsarchive.gwu.edu/document/15865-document-29-memorandum-conversation>

India would not conduct explosions using foreign-made technologies, and (c) make New Delhi abide by international treaties and reduce incentives to build an indigenous nuclear industry. The United States applied the most relevant instruments against nuclear proliferation in India via the Nuclear Non-Proliferation Act of 1978, which basically summarized the three sorts of mechanisms into an act. By tightening the criteria for nuclear cooperation, Washington embargoed any technological transference until the other partners assumed robust commitments to the existing nonproliferation regime by accepting full scope safeguards (INFCIRC/405). Carter's crusade against nuclear proliferation, establishing the SALT II with Moscow (1979), attained a unilateral dimension with this act – that could be waived only by presidential interest⁴⁴³.

It affected the work of nuclear reactors in Tarapur by restraining the delivery of enriched uranium – although the United States had signed an agreement to supply India with this sensitive material for peaceful purposes. I would claim that it represents smoking-gun evidence that the Middle Power Trap exists according to the proposed hypothesis. Even though Carter's decision to send nuclear materials to India and Reagan's administration reduced tensions with New Delhi in 1982⁴⁴⁴, this act attempted to squeeze Indians into a position of rule-taker. Previous studies noticed the United States' diplomatic body arguably claimed that it tried to employ peaceful instruments to cajole India to renounce nuclear ambitions, but it had to be more assertive against New Delhi's decisions (JAIN, 1980). In fact, this episode stormed Indian society and enhanced nationalistic feelings even in the national media outlets. Telegrams from the United States embassy in New Delhi claimed that local newspapers argued India had to consider obtaining enriched uranium from clandestine ways – e.g., an arguably existing commercial channel with Israeli groups⁴⁴⁵.

Other countries imposed some sources of direct pressure on India. The United Kingdom tried to convince New Delhi to adhere to nonproliferation mechanisms and embarked on the draw of export control mechanisms. Even France and the Soviet Union tried to reduce tensions with other NWSs by asking India to respect international rules while receiving foreign aid. In

⁴⁴³ United States. 1978 Foreign Relations of the United States, 1977-1980, Volume XIX, South Asia. "93.Letter from President Carter to Indian Prime Minister Desai". 30th January, 1978. In: National Archives, RG 59, Central Foreign Policy File, P780032-0527. Confidential. See: <https://history.state.gov/historicaldocuments/frus1977-80v19/d93#fn:1.5.4.4.16.109.16.4>

⁴⁴⁴ The United States accepted that France provide nuclear sensitive nuclear materials to India in order to feed reactors in Tarapur. See (SHAPLEY, 1982).

⁴⁴⁵ United States. FM AMEMBASSY NEW DELHI. 1978. "Indo-US Nuclear Relations: Press Reports". (2ns May 1978) Central Foreign Policy Files, created 7/1/1973 - 12/31/1979, documenting the period ca. 1973 - 12/31/1979 - *Record Group 59*. See <https://aad.archives.gov/aad/createpdf?rid=137585&dt=2694&dl=2009>

this sense, it is possible to observe that India faced an orchestrated attempt to make it, at least, accept some rules that went against its national interests in developing a robust nuclear industry. This context molded another important element that addressed the Indian issue via multilateral instances – the establishment of the NSG in 1974. Authors often demonstrate that this export control instrument aimed to prevent new loopholes explored by India to conduct nuclear tests via foreign-led assistance.

The NSG formalized in 1974 a combination of export control's initiatives⁴⁴⁶ into a multilateral group composed mainly of Western powers and Communist states. It initially counted on fifteen members⁴⁴⁷ (MARZO; DE ALMEIDA, 2006). Likewise, the NSG represented again the convergence between the Soviet Union and the United States in preserving the nuclear nonproliferation regime. Although the United States and the United Kingdom attempted to spread this group throughout the Third World during the 1970s, this mechanism imposed restrictions on the transference of sensitive technologies that composed a trigger list (INFCIRC/254) – previously suggested during the Zangger Committee. This sort of global cartel brought France into the nonproliferation structures. Since NSG dealt with a thorny issue for international relations, it stumbled in many hurdles to update guidelines – e.g., members did not meet from 1978 to 1990. Yet, it promoted a series of practices to harmonize rules over nuclear exportation according to the NPT goals.

In this sense, the elaboration of this instrument reinforced the idea that the nonproliferation mechanisms would be reinvented when defied. It reduced incentives to engage with countries considered “deviant agents” during the Cold War and it was basically emulated by Canadian companies when creating the Candu Owners Group, during the 1980s, to coordinate practices from countries that used this technology – and was employed to pressure India years later. For instance, France agreed to join the international embargo in 1976 on exports of reprocessing facilities – terminating contracts with Pakistan and creating concerns over partnerships with South Korea⁴⁴⁸. Likewise, the United States paid close attention to Indian

⁴⁴⁶ It was founded through meetings that occurred in London between 1975 to 1978 in order to restrict the possibilities of countries diverting nuclear technologies for the production of weapons. This movement occurred also in a moment when Pakistan was trying to purchase centrifuges components to compete against India. Socialist and Western states joined this initiative claiming it could result in ensuring that nuclear energy would be restricted to peaceful uses.

⁴⁴⁷ The United States, Canada, France, West Germany, the United Kingdom, the Soviet Union, Japan, East Germany, Belgium, Italy, Netherlands, Poland, Czechoslovakia, Sweden, Switzerland.

⁴⁴⁸ United States. 1975. “U.S. Embassy Seoul telegram 8023 to Department of State, “ROK Plans to Develop Nuclear Weapons and Missiles,” 2 December 1974, Secret, excised copy attached to W. R. Smyser and David Elliott to Secretary Kissinger, “Development of U.S. Policy Toward South Korean Development of Nuclear

movements on nuclear market – e.g., Washington was aware of Indian intentions to provide assistance to build a nuclear power plant in Argentina during the 1970s⁴⁴⁹. The most attentive case was the suspicion that Egypt had approached India, during 1970s, to find some support for military-led purposes. It triggered concerns in the United States' intelligence, but no further need was apparently taken since India did not engage in this idea⁴⁵⁰.

7.2.2 Indirect Way

Great powers have diplomatically pressured India to reconsider its national nuclear ambitions since the beginning of the debates about the draw of a nonproliferation regime. Documents demonstrate that Moscow, Ottawa, Washington, and London pressured India to acquiesce to the fundamental bulwarks of nonproliferation proposed by the NWSs⁴⁵¹. The objective has been cajoling India to accept that international efforts are the best way to safeguard international peace, although New Delhi wants to attain an S&T development through promoting a national self-sufficient industry. Furthermore, India complained that NWSs did not take into account its propositions over nonproliferation issues, claiming they were not compatible to international interests⁴⁵².

In this sense, great powers attempted to influence Indian nuclear policy through indirect ways. For example, the United States planned to use private and institutional channels for strength dialogues between Washington and the scientific community in India. A 1972 telegram from the United States embassy in New Delhi raised the possibility of using technological

Weapons," 28 February 1975, Secret" In: National Security Archive. See <https://nsarchive.gwu.edu/document/22670-document-06-u-s-embassy-seoul-telegram-8023>

⁴⁴⁹ United States. 1974. Department of State. "Continuing Reactions to India's Nuclear Test REF: 6919 (NOTAL)". The National Archives. Central Foreign Policy Files, created 7/1/1973 - 12/31/1979, documenting the period ca. 1973 - 12/31/1979 - *Record Group 59*. See: The National Archives. Central Foreign Policy Files, created 7/1/1973 - 12/31/1979, documenting the period ca. 1973 - 12/31/1979 - *Record Group 59*. See: <https://aad.archives.gov/aad/createpdf?rid=100268&dt=2474&dl=1345>

⁴⁵⁰ United States. Department of State. 1974. "Egypt and Libya Seek Nuclear Weapons Technology from India". In: The National Archives. Central Foreign Policy Files, created 7/1/1973 - 12/31/1979, documenting the period ca. 1973 - 12/31/1979 - *Record Group 59*. See: <https://aad.archives.gov/aad/createpdf?rid=182933&dt=2474&dl=1345>

⁴⁵¹ India. 1968. "Note from Ambassador M.A. Husain, 'NPT and Security Assurances'", April 11, 1968, Wilson Center Digital Archive, PN Haksar, III Installment – Subject File #200 <https://digitalarchive.wilsoncenter.org/document/134020>

⁴⁵² India. 1964. "Rajya Sabha Q&A on the US Rejection of India Support to the Recent Soviet Proposal to the Disarmament Committee", May 5, 1964, Wilson Center Digital Archive, Institute for Defence Studies and Analyses (ISDA), Rajya Sabha Q&A Documents. <https://digitalarchive.wilsoncenter.org/document/119812>

exchange for diplomatic ambitions⁴⁵³. Likewise, this strategy worked in tandem with the initiative of using propaganda instruments to enhance the United States' presence in India by diffusing the Voice of America radio station and cultural assets.

Yet, stigmatization (see Smetana 2020) became the main source of indirect way employed against India after 1974. As Saha (2022) noticed, NWSs ignored any justification of New Delhi. This context made India avoid possible nuclear and S&T ties with countries in order to avoid provocative moves. Likewise, other friendly countries to India (e.g., Brazil) avoided defending New Delhi in diplomatic negotiations due to concerns of possible retaliations from the NWSs. The 1974 nuclear test moved India towards the threshold of becoming a virtual diplomatic pariah since traditional Middle Powers also condemned these experiments⁴⁵⁴. It is worthwhile to bear in mind that assertive diplomatic reactions came mainly from Canada, Sweden and Japan⁴⁵⁵ - according to the previous literature (BLOOD, 1975). Even though New Delhi promoted a sense of pride among Third World countries, it coped with mistrusts from these states since nuclear proliferation became a sort of stigmatized menace. For example, the Indonesian society was divided because many groups did not share Indian feeling of pride for detonating a possible bomb⁴⁵⁶.

The fact that India explored nuclear technologies, indeed, sparked cautious reactions from other countries, such as the proposed hypothesis suggests. Stigmatization was reinforced by the Indian votes against Pakistani initiatives to ban nuclear weapons in the region – a controversial idea since Islamabad was working on developing a nuclear program. In addition, documents from the United States attested to the fear that India could set an S&T clandestine market in which even terrorist groups could access these sensitive technologies – the stigmatization of an NNWS that attained the same level of development as NWSs.

⁴⁵³ United States. 1972. “201. Telegram 300 From the Embassy in India to the Department of State”, January 9, 1972, 0427Z, Foreign Relations of the United States, Document ID Number: frus1969-76ve07d201, accessed on <http://www.history-lab.org>

⁴⁵⁴ I think it is relevant to highlight some issues raised by Joshi (2018) over the Indian diplomatic position in the nuclear field. In fact, India tried to negotiate the acceptance of nonproliferation rules since they did not prevent the national S&T development. Yet, both sides did not find, during the Cold War, robust convergence over these questions.

⁴⁵⁵ United States. Department of State. 1974. “Indian Nuclear Test REF: STATE 104647”. . In: The National Archives. Central Foreign Policy Files, created 7/1/1973 - 12/31/1979, documenting the period ca. 1973 - 12/31/1979 - *Record Group 59*. See: <https://aad.archives.gov/aad/createpdf?rid=108637&dt=2474&dl=1345>

⁴⁵⁶ United States. USMission IAEA Vienna. 1974 “Indonesia Official and Press Reaction to Indian Nuclear Test”. UNCLAS STATE 108248. In: The National Archives. Central Foreign Policy Files, created 7/1/1973 - 12/31/1979, documenting the period ca. 1973 - 12/31/1979 - *Record Group 59*. See: <https://aad.archives.gov/aad/createpdf?rid=100268&dt=2474&dl=1345>

Indeed, India faced diplomatic issues to advance on its national aims in the S&T field. This stigmatization process would be confirmed in 1998 due to the second nuclear test that made India an official “illegal” NWS. The Pokhran-II test triggered assertive reactions from the Western powers. It sparked a peculiar causal history that made India reaffirm its capabilities to overcome the Middle Power Trap. Previous literature addressed this topic, which is not a core aspect for this dissertation (see Pant 2011).

7.3. Concluding remarks

India could be considered the most relevant case of a country that overcame the Middle Power Trap. New Delhi faced many hurdles employed by NWSs due to the existence of the nonproliferation regime. Even traditional middle powers reinforced this pressure because stigmatizing a deviant case in nuclear terms became normal due to the pervasiveness of the international regime. In conclusion, this shadow case reinforced the confidence in the proposed hypothesis. India demonstrates, for example, that results are not deterministically defined when the Middle Power Trap works. As my hypothesis claimed, countries can deal with these foreign pressures by mobilizing national resources.

I emphasize that India developed a long-lasting nuclear policy during the beginning of the Cold War. It persisted in finding solutions to accomplish the three-stage nuclear program – although it lasts many years to fulfill the next steps. Abraham (1998) argued that it was motivated by a kind of fetish over S&T policies to promote economic growth and the international prestige. I agree with him that some scientists lure policymakers into an idea that their plans could make India attain global interests. It became easier since the Indian political elite assumed that science was a necessary condition to morph the country into a great power. Yet, Indian S&T efforts are outstanding and meaningful when it comes to the talk about the scientific development of Global South countries – a valorized asset in the status dispute.

For example, the three-stage program has been working on the construction of prototype FBRs by the IGCAR via public endorsement. By commissioning this reactor, India would move into the second step. This country became a symbol of “big science” development and also invested in the space program during the last years. In this sense, I would claim that this centrality of scientists in sustaining a full-fledged project induced policymakers to apply measures to overcome international hindering efforts. By believing that their state deserved the role of a great power due to civilizational and historical aspects, Indian policymakers hung onto

scientists' works to pursue this ambition. The valorization of scientists in this field and political interests made India pay close attention to how to attain the goal of nuclear self-sufficiency. In this sense, this country worked to reduce dependence on foreign assistance.

As this chapter demonstrated, India faced direct and indirect ways of pressure. The Middle Power Trap tried to make India abide by rules – as envisaged by great powers. However, Indian insistence on maintaining a long-lasting nuclear project mobilized resources to overcome these hurdles. It does not mean that India is a country that valorizes science in all domains, as the chapter emphasized. Nonetheless, India demonstrated that it prioritized the capability of mobilizing national human resources in an organized plan towards the nuclear autonomy. It represents a relevant discussion to IR studies that I would readdressed during the concluding chapter.

In this sense, I am not considering India a role model for Global South countries. I agree with Frey (2009) that Indian strategic policymakers became an isolated all-mighty group who stigmatizes divergent opinions to attain their nationalistic aims. However, India offers a case where domestic resources were mobilized to handle the Middle Power Trap's pressures. It faced many challenges posed by great powers, but, as the literature recognizes, New Delhi works to become a consolidated aspiring country to the exclusive high stratum of international social hierarchy (see Kavalski 2022).

8. FINAL REMARKS

IR schools of thought about international regimes organize a relevant debate about how these frameworks of regulating instruments perform a crucial role within international relations (see Chapter 3). Normative critical theories, composing the realm of imposed-idealistic approaches (see Chapter 4), can provide valuable insights into these debates when systematized into a formal methodological explanation. The Middle Power Trap, in this sense, is a theoretical construct that provides a causal mechanism to further analyses concerning the main questions raised by this field: (a) how the international regimes preserve the hegemony of great powers, and (b) how international regimes influence the international ambitions of states that challenge the existing order.

This dissertation proposed the Middle Power Trap to explain an outcome observed in Brazilian nuclear history – an emerging regional power that renounced its initial ambitions to push for an autonomous nuclear program to assume a traditional middle power behavior in this S&T field. Countries usually rely, in a certain instance, on the international market. Yet, Brazil reduced drastically local interests in establishing a consolidated nuclear industry – for example, it still struggles to set up a plant to build a facility to make UF₆ and imports most part of the fuel employed in the two nuclear plants operating in the country while the third (Angra III) has been under an endless construction process.

This national puzzle, involving a Global South country, can potentially refine IR's existing knowledge of how a relevant international regime affected the ambitions of a state in the global dispute for higher social standing. The Middle Power Trap explained how a core topic of the Cold War era mobilized great powers to define the main guidelines to regulate access to a dual-use technology while sustaining the privileged place among other countries. This dissertation addressed a Brazilian puzzle to observe how international phenomena composed the analytical context. Great powers basically defined and worked to legitimize the proposed nonproliferation regime during the Cold War. I collected documents and listened to former diplomats and scholars, these sources affirmed that analyzed world order resided in a hierarchical structure that affected the making of the nonproliferation regime. It is relevant for IR studies to shed light on how this context influenced the S&T policy of a country that tried to master nuclear energy to grow national economy and bring scientific prestige – two aspects that would permit the Brazil to be accepted as a potential great power.

However, the most relevant topics this study unveiled are the two followings. Firstly, the Middle Power Trap comprises instruments that induce countries to depend on imported sensitive technologies. It preserves the S&T advantages sustained by great powers vis-à-vis other countries. For instance, foreign assistance became a sort of instrument that influence the development of an emerging regional power and its status ambitions. Secondly, policymaking processes are relevant to understand how a state handles the Middle Power Trap. Nuclear projects are part of the S&T field, much broader than a simple diplomatic dimension. In this sense, I can infer that a crucial condition to explain why Brazil did not overcome the causal forces employed by the great powers via Middle Power Trap. It sustain this argument because the shadow case also confirmed the importance of this topic in the Indian case.

Indeed, I would never say that it is a sufficient condition to explain the differences between the advances observed in India vis-à-vis Brazil in the nuclear field. There are geographical factors (e.g., Brazilian hydraulic resources), economical aspects and even geopolitical elements that I exposed during the dissertation. Yet, the development of a robust S&T policy is an element to take into consideration.

In this sense, I would emphasize the following topics as the main findings of this research:

- The imposed-idealistic school of thought can provide important contributions to the discussion of the nonproliferation regime by arguing that this structure revolves around hierarchical disputes among states in an S&T field. This fundamental area for international relations triggered disputes among countries over the mastering of these technologies - a valuable asset according to social understandings. In this sense, the Middle Power Trap summarized existing knowledge into a single qualitative causal mechanism that demonstrated the agency of great powers (the NWSs) to mobilize international instruments to regulate the world order and reduce the possibility of deviance.
- The Middle Power Trap facilitates the understanding of the outcomes observed in the Brazilian nuclear history. Brazil acquiesced to the most part of nonproliferation regime due to the need to avoid an international stigma and gain reputational assets – a traditional middle power behavior. Brazil is not a traditional middle power, but it chose to act like one due to the fear of international repudiation. In this sense, the Middle Power Trap demonstrates the

real objective: preserve the existing order against emerging menaces from possible competitors. The higher stratum does not want to share its privileged position.

- S&T is a relevant – but ill-addressed – field in IR studies. Science is not exclusively a diplomatic or military dispute among states. Although diplomats represent the official interest of countries, it is fundamental to delve into how states draw and carry out their scientific programs. For instance, Brazil always proclaimed that it favored the freedom of scientific development and the right to conduct experiments without foreign interference. Yet, the question is: what have Brazilian policymakers done to foment the S&T progress in the country? The role of scientists and practitioners is crucial to understand the capabilities of a country within the international system. I would encourage next scholars interested to analyze Brazilian nuclear policy to unveil the incredible potential observed in the archive of nuclear scientific institutions (CNEN, IPEN, Eletrobras, and so on) – rather than exploring only Itamaraty’s documents.
- Emerging regional powers need a long-lasting strategy to preserve their ambitions in the international system and enhance their material capabilities. Science is not a military exclusive component, so I will avoid claiming that these countries need a kind of “great strategy” – since this is a geopolitical buzzword. I prefer encouraging these states to analyze how they can provide benefits to their population and improve international status through local efforts. As I told during this research, Brazil lost many opportunities to consolidate a robust scientific network based upon national initiatives such as the Thorium Group in the UFMG.
- The nuclear history needs, in this sense, a more scientific-led approach in IR studies. I mean, tell the perspective of scientists beyond the geopolitical aspects. The use of thorium as a possible fertile nuclear element is a political phenomenon that needs a more in-depth approach. Brazil lags behind India in an S&T realm that it could have elaborated a robust scientific project via the initiatives born in the UFMG and the assistance of West Germany or the United States-led proposed in 1977.
- Foreign assistance favors nuclear dependency when policymakers do not develop a full-fledged S&T strategy to employ them in favor of indigenous

scientific programs. National initiatives could not flourish because of the lack of governmental support. By spending the federal budget on equipment and foreign-led projects, indigenous scientific projects did not obtain the necessary resources. It does not condemn foreign assistance as a mechanism to hamper receiving countries' attempts to attain nuclear autonomy. The meaning of foreign assistance in this context depends on how states draw their S&T policies.

These aspects reinforced the relevance of studies about the material and subjective assets applied to make an emerging regional power abide by rules. The Middle Power Trap complements the literature about international regimes and the global struggle for status. Likewise, it refines the existing knowledge about the instruments a stigmatized agent can mobilize to resist the causal forces employed against its ambitions and interests. This causal mechanism can help the next IR studies to address the consequences of the world order's mechanisms to preserve the existing hegemonic structure. As a theoretical conclusion, the nonproliferation regime demonstrated that authors could engage in investigations about how great powers agency mold global rules and values that influence the possibilities of a Global South/Third World country ascending to the same exclusive club of consolidated rule-makers.

I hope this study inspires other analyses about how the Middle Power Trap affected the development of other countries in the nuclear field or in other S&T areas. Being a world order phenomenon, I believe this causal mechanism operates in other contexts. Aspiring to embolden the IR literature, this theoretical construct opens new avenues for other scholars to undertake similar research designs to check the external validity of this mechanism in other regimes. In this sense, further possible research agendas deriving from the conclusion of this study are:

- Checking if the Middle Power Trap can be applied to understand other international regimes and the consequences to the development of emerging regional powers. I guess, for example, it would be interesting delving into how great powers formulate regulating regimes for these new dual-use technologies involving robotics or biological weapons.
- Analyze whether the Middle Power Trap operates in international regimes related to economic agendas or environmental issues. These are contexts that emerging regional powers complain about the privileged position filled by great powers while other countries have to abide by restricted rules or follow some prescribed ways of development. I think the Middle Power Trap can provide

valuable insight into debates about economic development history by complementing critical analyses such as the studies of (CHANG, 2002).

- The Middle Power Trap could be employed to refine studies about stigmatization since it demonstrates how great powers detain agency over international mechanisms and legitimize their understandings as “good manners and practices”. This study complements the analysis of Zarakol (2010) by arguing the world order imposes a social context that constrains emerging regional powers to assume challenging positions against discriminatory rules. Likewise, this study also complements the analysis of Smetana (2020), Adler-Nissen (2014), and Onderco (2015) about how stigmatized agents could manage international pressures.
- Finally, this study enable an in-depth investigation about the realm of S&T in the international relations. This topic provides a different interdisciplinary perspective to the IR field. Realists, for example, usually develop quantitative databases to measure the material capabilities of states. The investment on S&T represents an interesting variable since it enables a country to attain self-sufficiency in the production of sensitive technologies.

These agendas can enhance existing knowledge on topics related to the IR field. During this research, I came across different sources of bias commonly replied to in studies about the nuclear history of emerging regional powers. I did not renounce my own Brazilian lenses of global understanding, but I think that studies my colleagues from Brazil have to expand their interests in nuclear studies to the scientific community and non-state actors’ opinions. I admire the work of Adler (1987) and Abraham (1992) who inspired me to go fully on the archives of different agents and not to reply to the official version of the Brazilian nuclear history – told by the Itamaraty. I learned a lot with Dawisson Belém Lopes and Carlo Patti who encouraged me to properly analyze documents in the FGV-CDPOC library – but also look for different sources in the CNEN, *Museu da Eletricidade*, CNPq, and the Wilson Center. Interviews made me realize that Brazilian nuclear history is still an untold chapter of a relevant episode to the studies of international relations. Brazil represents more than a case of an emerging regional power that claimed nonproliferation rules were discriminatory. It represents a case of a country that

faced many hurdles to compete with great powers due to the lack of a cohesive S&T policy.

I would suggest, likewise, to other analysts take into consideration the lack of a long-lasting S&T project in Brazilian history. The military dictatorship planned the use of nuclear energy through a mammoth plan of building eight new power plants and mastered cutting-edge technology by developing the parallel program. It did not produce a robust outcome because the country persecuted scientists and dramatically reduced the available funds for universities and scientific programs. Studies with thorium did not flourish as a priority since Brazil feared the international reactions of partners and the lack of interest in boosting national initiatives that enabled the internationalization of the UFMG in the nuclear field. I would consider the plan of João Goulart the most interesting in these terms since it established the idea of using foreign assistance to promote scientific studies in Brazil and the use of thorium – similar to the Indian project. He was overthrown by the military coup d'état in 1964.

Finally, my last caveat for post-graduating students is that there is a myriad of documents about Indian nuclear history available. These primary sources reinforce the produced inferences and can bring new elements to the debate. For example, the Wilson Center maintains a massive amount of documents that can enrich the debate. I read many studies about India in Brazil that still relies on secondary sources to interpret India. I do not claim that this literature is not important. However, I believe Brazilian students have to address assertively the investigation of India – a country that enables many important analyses to understand how an emerging regional power can postulate to the status of great power.

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ANNEX 1 - List of Diplomatic Initiatives about Nonproliferation and Disarmament (prior to the NPT):

Name	Establishment	Members (P: permanent)	Objective
Ad Hoc Committee to Study the Peaceful Uses of the Sea-bed and the Ocean Floor Beyond the Limits of National Jurisdiction	1967 (A/RES/2340 (XXII))	P: Argentina, Australia, Austria, Belgium, Brazil, Bulgaria, Canada, Ceylon, Chile, Czechoslovakia, Ecuador, El Salvador, France, Iceland, India, Italy, Japan, Kenya, Liberia, Libya, Malta, Norway, Pakistan, Peru, Poland, Romania, Senegal, Somalia, Thailand, the Soviet Union, United Arab Republic., the United Kingdom., Tanzania, the United States, and Yugoslavia.	Establish a plan with specialized agencies (e.g., IAEA) to develop regulatory agreements concerning the exploration and conservation of these areas – for example, preventing nuclear test in these environments.
United Nations Atomic Energy Commission	1946 (A/RES/1 (I)) Dissolution: 1952 (A/RES/502 (VI)).	P: All UNSC permanent members and Canada.	Make specific proposal about the peaceful use of nuclear energy and impose safeguards against the usage of these assets for military-led purposes.
Committee on the Peaceful Uses of Outer Space	1959 (A/RES/1472 (XV))	All members were permanent. (28) ⁴⁵⁷ : Albania, Argentina, Australia, Austria, Belgium, Brazil, Bulgaria, Canada, Chad, Czechoslovakia, France, Hungary, India, Iran, Italy, Japan, Lebanon, Mexico, Mongolia, Morocco, Poland, Romania, Sierra Leone, Sweden, the Soviet Union, the United Arab	Discuss the usage of spatial technologies and draw rules over this context.

⁴⁵⁷ The last modification during the scrutinized period was in 1961 (A/RES/1348 (XIII)).

		Republic, the United Kingdom and the United States.	
Commission for Conventional Armaments	1947 (S/RES/18) Dissolution: 1952 (A/RES/502).	P: the UNSC five permanent members. Nonpermanent members: Egypt, Mexico, Netherlands (1946); Australia, Brazil, Poland (1946-1947); Belgium, Colombia, Syria (1947-1948); Argentina, Canada, Ukraine (1948- 1949); Cuba, Egypt, Norway (1949-1950); Ecuador, India, Yugoslavia (1950- 1951); Brazil, Netherlands, Turkey (1951).	Reducing military expenditures and impose restriction to the manufacture of non-nuclear weapons.
Disarmament Commission	1952 (A/RES/502 (VI))	All states of the UN were permanent members since 1959. Previously, P: the Soviet Union, the United States, the United Kingdom, China, France, and Canada.	Prepare plans and proposals for reducing military expenditures and eradicate weapons of mass destruction.
Eighteen Nations Committee on Disarmament	1961 (A/RES/1722 (XVI))	P: Brazil, Bulgaria, Burma, Canada, Czechoslovakia, Ethiopia, India, Italy, Mexico, Nigeria, Poland, Rumania, Sweden, United Arab Republic, the United States, the United Kingdom, and the Soviet Union. Subcommittee on a Treaty for the Discontinuance of Nuclear Weapons Test: the United States, the United Kingdom, and the Soviet Union. Permanent Cochairmen: the United States and the Soviet Union.	Prepare a proposal for stop nuclear tests and a global denuclearization.

Antarctic Treaty	1961 (Antarctic Conference convened concluded in 1959)	Twelve countries initially signed this treaty. Argentina, Australia, Chile, France, New Zealand, Norway and the United Kingdom had territorial claims. Washington and Moscow maintained "basis of claim". The United States convened this conference. Initiatives to bring the Antarctic issue to UNGA failed.	Promote international cooperation in scientific investigations in Antarctic and prohibit any disposal of nuclear waste or undertaking of tests in the continent.
Ten Nations Committee on Disarmament	1959 (Four Powers Communiqué). Dissolved in 1961 to form the ENCD.	P: the United States, the United Kingdom, the Soviet Union, Canada, France, Czechoslovakia, Italy, Poland, Romania.	Prepare a proposal for stop nuclear tests and a global denuclearization.
Geneva Conference on the Discontinuance of Nuclear Weapons Tests	1958-1962	P: The United Kingdom, the United States, and the Soviet Union.	Establish a global moratorium on nuclear tests.
Secretary-General's Group of Consultant Experts	1967	P: Appointed by Secretary-General U Thant. Experts from Canada, France, India, Japan, Mexico, Nigeria, Norway, Poland, Sweden, the United Kingdom, the United States, and the Soviet Union.	Understand the impacts of nuclear weapons.
Conference of Non-Nuclear Weapon States	1968	P: Afghanistan, Algeria, Argentina, Australia, Austria, Belgium, Bolivia, Brazil, Bulgaria, Burma, Burundi, Cameroon, Canada, Ceylon, Chile, China, Colombia, Costa Rica, Czechoslovakia, Dahomey, Denmark, Dominican Republic, Ecuador, El Salvador, Ethiopia, West Germany, Finland, Ghana, Greece, Guatemala, Hungary, India, Indonesia, Iran, Iraq,	Introduce effective measures to global denuclearization that safeguard the best interests of NNWS.

Ireland, Israel, Italy, Ivory
Coast Jamaica, Japan, Jordan,
Kenya, Kuwait, Laos,
Lebanon, Liberia, Libya,
Liechtenstein, Luxembourg,
Madagascar, Malta, Mauritius,
Mexico, Mongolia, Morocco,
Netherlands, New Zealand,
Nicaragua, Nigeria, Norway,
Pakistan, Panama, Paraguay,
Peru, Philippines, Poland,
Portugal, South Korea,
Republic of Vietnam,
Romania, San Marino, Saudi
Arabia, Somalia, South Africa,
Southern Yemen, Spain,
Sweden, Switzerland, Syria,
Thailand, Trinidad and
Tobago, Tunisia, Turkey,
Uganda, United Arab
Republic, United Republic of
Tanzania, Uruguay,
Venezuela, Yemen,
Yugoslavia, and Zambia.

Not- voting members: the
United States, France, the
United Kingdom, and the
Soviet Union.

Source: Documents on International Disarmament from UN compiled by the DoS. Available at: <https://www.un.org/disarmament/publications/documents-on-disarmament/>

ANNEX 2 – List of Head of States/UN Secretary-General during the analyzed period

Country/ year	United States	United Kingdom (Prime Minister)	Soviet Union	France	China	Brazil	India
1947	Truman	Attlee	Stalin	Auriol	Kai- shek ⁴⁵⁸	Dutra	Nehru
1948	Truman	Attlee	Stalin	Auriol	Kai-shek	Dutra	Nehru
1949	Truman	Attlee	Stalin	Auriol	Zedong	Dutra	Nehru
1950	Truman	Attlee	Stalin	Auriol	Zedong	Dutra	Nehru
1951	Truman	Churchill	Stalin	Auriol	Zedong	Vargas	Nehru
1952	Truman	Churchill	Stalin	Auriol	Zedong	Vargas	Nehru
1953	Eisenhower	Churchill	Khrushchev	Auriol	Zedong	Vargas	Nehru
1954	Eisenhower	Churchill	Khrushchev	Coty	Zedong	Vargas	Nehru
1955	Eisenhower	Eden	Khrushchev	Coty	Zedong	Café Filho	Nehru
1956	Eisenhower	Eden	Khrushchev	Coty	Zedong	Kubitschek	Nehru
1957	Eisenhower	Macmillan	Khrushchev	Coty	Zedong	Kubitschek	Nehru
1958	Eisenhower	Macmillan	Khrushchev	Coty	Zedong	Kubitschek	Nehru
1959	Eisenhower	Macmillan	Khrushchev	Coty	Zedong	Kubitschek	Nehru
1960	Eisenhower	Macmillan	Khrushchev	de Gaulle	Zedong	Kubitschek	Nehru
1961	Kennedy	Macmillan	Khrushchev	de Gaulle	Zedong	Quadros	Nehru
1962	Kennedy	Macmillan	Khrushchev	de Gaulle	Zedong	Goulart	Nehru
1963	Kennedy	Macmillan	Khrushchev	de Gaulle	Zedong	Goulart	Nehru
1964	Johnson	Douglas- Home	Khrushchev	de Gaulle	Zedong	Castelo Branco	Nehru
1965	Johnson	Wilson	Brezhnev	de Gaulle	Zedong	Castelo Branco	Shastri
1966	Johnson	Wilson	Brezhnev	de Gaulle	Zedong	Castelo Branco	Shastri
1967	Johnson	Wilson	Brezhnev	de Gaulle	Zedong	Costa e Silva	Gandhi
1968	Johnson	Wilson	Brezhnev	de Gaulle	Zedong	Costa e Silva	Gandhi
1969	Nixon	Wilson	Brezhnev	Pompidou	Zedong	Costa e Silva	Gandhi
1970	Nixon	Wilson	Brezhnev	Pompidou	Zedong	Médici	Gandhi
1971	Nixon	Heath	Brezhnev	Pompidou	Zedong	Médici	Gandhi
1972	Nixon	Heath	Brezhnev	Pompidou	Zedong	Médici	Gandhi
1973	Nixon	Heath	Brezhnev	Pompidou	Zedong	Médici	Gandhi
1974	Nixon/Ford	Heath	Brezhnev	Giscard d'Estaing	Zedong	Geisel	Gandhi
1975	Ford	Wilson	Brezhnev	Giscard d'Estaing	Zedong	Geisel	Gandhi
1976	Ford	Wilson	Brezhnev	Giscard d'Estaing	Zedong	Geisel	Gandhi
1977	Carter	Callaghan	Brezhnev	Giscard d'Estaing	Guofeng	Geisel	Desai

⁴⁵⁸ Prior the Chinese Revolution in 1949.

1978	Carter	Callaghan	Brezhnev	Giscard d'Estaing	Guofeng	Geisel	Desai
1979	Carter	Thatcher	Brezhnev	Giscard d'Estaing	Guofeng	Figueiredo	Gandhi
1980	Carter	Thatcher	Brezhnev	Giscard d'Estaing	Guofeng	Figueiredo	Gandhi
1981	Reagan	Thatcher	Brezhnev	Mitterrand	Xiaoping	Figueiredo	Gandhi
1982	Reagan	Thatcher	Andropov	Mitterrand	Xiaoping	Figueiredo	Gandhi
1983	Reagan	Thatcher	Andropov	Mitterrand	Xiaoping	Figueiredo	Gandhi
1984	Reagan	Thatcher	Chernenko	Mitterrand	Xiaoping	Figueiredo	Rajiv 459
1985	Reagan	Thatcher	Gorbachev	Mitterrand	Xiaoping	Sarney	Rajiv
1986	Reagan	Thatcher	Gorbachev	Mitterrand	Xiaoping	Sarney	Rajiv
1987	Reagan	Thatcher	Gorbachev	Mitterrand	Xiaoping	Sarney	Rajiv
1988	Reagan	Thatcher	Gorbachev	Mitterrand	Xiaoping	Sarney	Rajiv
1989	Bush	Thatcher	Gorbachev	Mitterrand	Xiaoping	Sarney	Rajiv
1990	Bush	Thatcher	Gorbachev	Mitterrand	Zemin	Collor	Rajiv
1991	Bush	Major	Gorbachev	Mitterrand	Zemin	Collor	Rajiv

ANNEX 3 - Treaty on the Non-Proliferation of Nuclear Weapons (NPT)

Text of the Treaty

The States concluding this Treaty, hereinafter referred to as the Parties to the Treaty,

Considering the devastation that would be visited upon all mankind by a nuclear war and the consequent need to make every effort to avert the danger of such a war and to take measures to safeguard the security of peoples,

Believing that the proliferation of nuclear weapons would seriously enhance the danger of nuclear war,

In conformity with resolutions of the United Nations General Assembly calling for the conclusion of an agreement on the prevention of wider dissemination of nuclear weapons,

Undertaking to co-operate in facilitating the application of International Atomic Energy Agency safeguards on peaceful nuclear activities,

Expressing their support for research, development and other efforts to further the application, within the framework of the International Atomic Energy Agency safeguards system, of the principle of safeguarding effectively the flow of source and special fissionable materials by use of instruments and other techniques at certain strategic points,

Affirming the principle that the benefits of peaceful applications of nuclear technology, including any technological by-products which may be derived by nuclear-weapon States from the development of nuclear explosive devices, should be available for peaceful purposes to all Parties to the Treaty, whether nuclear-weapon or non-nuclear-weapon States,

Convinced that, in furtherance of this principle, all Parties to the Treaty are entitled to participate in the fullest possible exchange of scientific information for, and to contribute alone or in co-operation with other States to, the further development of the applications of atomic energy for peaceful purposes,

Declaring their intention to achieve at the earliest possible date the cessation of the nuclear arms race and to undertake effective measures in the direction of nuclear disarmament,

Urging the co-operation of all States in the attainment of this objective,

Recalling the determination expressed by the Parties to the 1963 Treaty banning nuclear weapons tests in the atmosphere, in outer space and under water in its Preamble to seek to achieve the discontinuance of all test explosions of nuclear weapons for all time and to continue negotiations to this end,

Desiring to further the easing of international tension and the strengthening of trust between States in order to facilitate the cessation of the manufacture of nuclear weapons, the liquidation of all their existing stockpiles, and the elimination from national arsenals of nuclear weapons and the means of their delivery pursuant to a Treaty on general and complete disarmament under strict and effective international control,

Recalling that, in accordance with the Charter of the United Nations, States must refrain in their international relations from the threat or use of force against the territorial integrity or political independence of any State, or in any other manner inconsistent with the Purposes of the United Nations, and that the establishment and maintenance of international peace and security are to be promoted with the least diversion for armaments of the world's human and economic resources,

Have agreed as follows:

Article I

Each nuclear-weapon State Party to the Treaty undertakes not to transfer to any recipient whatsoever nuclear weapons or other nuclear explosive devices or control over such weapons or explosive devices directly, or indirectly; and not in any way to assist, encourage, or induce any non-nuclear-weapon State to manufacture or otherwise acquire nuclear weapons or other nuclear explosive devices, or control over such weapons or explosive devices.

Article II

Each non-nuclear-weapon State Party to the Treaty undertakes not to receive the transfer from any transferor whatsoever of nuclear weapons or other nuclear explosive devices or of control over such weapons or explosive devices directly, or indirectly; not to manufacture or otherwise acquire nuclear weapons or other nuclear explosive devices; and not to seek or receive any assistance in the manufacture of nuclear weapons or other nuclear explosive devices.

Article III

1. Each non-nuclear-weapon State Party to the Treaty undertakes to accept safeguards, as set forth in an agreement to be negotiated and concluded with the International Atomic Energy Agency in accordance with the Statute of the International Atomic Energy Agency and the Agency's safeguards system, for the exclusive purpose of verification of the fulfilment of its obligations assumed under this Treaty with a view to preventing diversion of nuclear energy from peaceful uses to nuclear weapons or other nuclear explosive devices. Procedures for the safeguards required by this Article shall be followed with respect to source or special fissionable material whether it is being produced, processed or used in any principal nuclear facility or is outside any such facility. The safeguards required by this Article shall be applied on all source or special fissionable material in all peaceful nuclear activities within the territory of such State, under its jurisdiction, or carried out under its control anywhere.

2. Each State Party to the Treaty undertakes not to provide: (a) source or special fissionable material, or (b) equipment or material especially designed or prepared for the processing, use or production of special fissionable material, to any non-nuclear-weapon State for peaceful purposes, unless the source or special fissionable material shall be subject to the safeguards required by this Article.

3. The safeguards required by this Article shall be implemented in a manner designed to comply with Article IV of this Treaty, and to avoid hampering the economic or technological development of the Parties or international co-operation in the field of peaceful nuclear activities, including the international exchange of nuclear material and equipment for the processing, use or production of nuclear material for peaceful purposes in accordance with the provisions of this Article and the principle of safeguarding set forth in the Preamble of the Treaty.

4. Non-nuclear-weapon States Party to the Treaty shall conclude agreements with the International Atomic Energy Agency to meet the requirements of this Article either individually or together with other States in accordance with the Statute of the International Atomic Energy Agency. Negotiation of such agreements shall commence within 180 days from the original entry into force of this Treaty. For States depositing their instruments of ratification or accession after the 180-day period, negotiation of such agreements shall commence not later than the date of such deposit. Such agreements shall enter into force not later than eighteen months after the date of initiation of negotiations.

Article IV

1. Nothing in this Treaty shall be interpreted as affecting the inalienable right of all the Parties to the Treaty to develop research, production and use of nuclear energy for peaceful purposes without discrimination and in conformity with Articles I and II of this Treaty.

2. All the Parties to the Treaty undertake to facilitate, and have the right to participate in, the fullest possible exchange of equipment, materials and scientific and technological information for the peaceful uses of nuclear energy. Parties to the Treaty in a position to do so shall also cooperate in contributing alone or together with other States or international organizations to the further development of the applications of nuclear energy for peaceful purposes, especially in the territories of non-nuclear-weapon States Party to the Treaty, with due consideration for the needs of the developing areas of the world.

Article V

Each Party to the Treaty undertakes to take appropriate measures to ensure that, in accordance with this Treaty, under appropriate international observation and through appropriate international procedures, potential benefits from any peaceful applications of nuclear explosions will be made available to non-nuclear-weapon States Party to the Treaty on a non-discriminatory basis and that the charge to such Parties for the explosive devices used will be as low as possible and exclude any charge for research and development. Non-nuclear-weapon States Party to the Treaty shall be able to obtain such benefits, pursuant to a special international agreement or agreements, through an appropriate international body with adequate representation of non-nuclear-weapon States. Negotiations on this subject shall commence as soon as possible after the Treaty enters into force. Non-nuclear-weapon States Party to the Treaty so desiring may also obtain such benefits pursuant to bilateral agreements.

Article VI

Each of the Parties to the Treaty undertakes to pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament, and on a treaty on general and complete disarmament under strict and effective international control.

Article VII

Nothing in this Treaty affects the right of any group of States to conclude regional treaties in order to assure the total absence of nuclear weapons in their respective territories.

Article VIII

1. Any Party to the Treaty may propose amendments to this Treaty. The text of any proposed amendment shall be submitted to the Depositary Governments which shall circulate it to all Parties to the Treaty. Thereupon, if requested to do so by one-third or more of the Parties to the Treaty, the Depositary Governments shall convene a conference, to which they shall invite all the Parties to the Treaty, to consider such an amendment.

2. Any amendment to this Treaty must be approved by a majority of the votes of all the Parties to the Treaty, including the votes of all nuclear-weapon States Party to the Treaty and all other Parties which, on the date the amendment is circulated, are members of the Board of Governors of the International Atomic Energy Agency. The amendment shall enter into force for each Party that deposits its instrument of ratification of the amendment upon the deposit of such instruments of ratification by a majority of all the Parties, including the instruments of ratification of all nuclear-weapon States Party to the Treaty and all other Parties which, on the date the amendment is circulated, are members of the Board of Governors of the International Atomic Energy Agency. Thereafter, it shall enter into force for any other Party upon the deposit of its instrument of ratification of the amendment.

3. Five years after the entry into force of this Treaty, a conference of Parties to the Treaty shall be held in Geneva, Switzerland, in order to review the operation of this Treaty with a view to assuring that the purposes of the Preamble and the provisions of the Treaty are being realised. At intervals of five years thereafter, a majority of the Parties to the Treaty may obtain, by submitting a proposal to this effect to the Depositary Governments, the convening of further conferences with the same objective of reviewing the operation of the Treaty.

Article IX

1. This Treaty shall be open to all States for signature. Any State which does not sign the Treaty before its entry into force in accordance with paragraph 3 of this Article may accede to it at any time.

2. This Treaty shall be subject to ratification by signatory States. Instruments of ratification and instruments of accession shall be deposited with the Governments of the United Kingdom of Great Britain and Northern Ireland, the Union of Soviet Socialist Republics and the United States of America, which are hereby designated the Depositary Governments.
3. This Treaty shall enter into force after its ratification by the States, the Governments of which are designated Depositories of the Treaty, and forty other States signatory to this Treaty and the deposit of their instruments of ratification. For the purposes of this Treaty, a nuclear-weapon State is one which has manufactured and exploded a nuclear weapon or other nuclear explosive device prior to 1 January 1967.
4. For States whose instruments of ratification or accession are deposited subsequent to the entry into force of this Treaty, it shall enter into force on the date of the deposit of their instruments of ratification or accession.
5. The Depositary Governments shall promptly inform all signatory and acceding States of the date of each signature, the date of deposit of each instrument of ratification or of accession, the date of the entry into force of this Treaty, and the date of receipt of any requests for convening a conference or other notices.
6. This Treaty shall be registered by the Depositary Governments pursuant to Article 102 of the Charter of the United Nations.

Article X

1. Each Party shall in exercising its national sovereignty have the right to withdraw from the Treaty if it decides that extraordinary events, related to the subject matter of this Treaty, have jeopardized the supreme interests of its country. It shall give notice of such withdrawal to all other parties to the Treaty and to the United Nations Security Council three months in advance. Such notice shall include a statement of the extraordinary events it regards as having jeopardized its supreme interests.
2. Twenty-five years after the entry into force of the Treaty, a conference shall be convened to decide whether the Treaty shall continue in force indefinitely, or shall be extended for an additional fixed period or periods. This decision shall be taken by a majority of the Parties to the Treaty.

Article XI

This Treaty, the English, Russian, French, Spanish and Chinese texts of which are equally authentic, shall be deposited in the archives of the Depositary Governments. Duly certified copies of this Treaty shall be transmitted by the Depositary Governments to the Governments of the signatory and acceding States.

IN WITNESS WHEREOF the undersigned, duly authorized, have signed this Treaty.

DONE in triplicate, at the cities of London, Moscow and Washington, the first day of July, one thousand nine hundred and sixty-eight.

Source: UNODA. 2021. Treaty on the Non-Proliferation of Nuclear Weapons (NPT). Available at <https://www.un.org/disarmament/wmd/nuclear/npt/>

ANNEX 4 – UN Document Symbols

This explanation was originally published in the UN's website. The first component refers to the organ in which the document was generated (A/ - UNGA, S/ - UNSC). Sometimes, it indicates a specific commission (ENCD/). If there is a subsidiary body involved, it becomes a second component (/AC/ – Ad hoc committee; /C/ permanent commission; /C.1/ First (Political and Security) Committee of the UNGA; /CN/ Commission; /CONF./ conference; /GC Governing council; /PC/ preparatory committee; /SC/ subcommittee; /WG/ working group). Otherwise, the second component is the nature of the document (/RES/ resolution; /WP/ working paper; /R/ restricted distribution; /PRST/ Statement by the President of the Security Council). A third component reflects possible modifications to the original text (/Add addendum; /Amend amendment; /Corr corrigendum; /Rev revision). Then, there is the number of the document and, in Roman numerals in parentheses, the session information.

An example: A (UNGA)/ RES (Resolution) / 2901 (number) (XXVI) (session information).

Source: UN. 2021. UN Documentation: Overview. Available at: <https://research.un.org/en/docs/symbols>

ANNEX 5 – Interviews and respective citations

Olga Simbalista	Former scientist from the Thorium Group. Worked as head of Strategic Studies Advisory and Planning Superintendent at Nuclebrás and planning coordinator at Eletronuclear.	Simbalista, 2022	Online
Luiz Augusto Castro Neves	Brazilian Ambassador. He used to represent Brazil in the IAEA (1978-1985).	Neves, 2022	Online
Sérgio de Queiroz Duarte	Retired Brazilian diplomat who serves currently as President of the Pugwash Conferences on Science and World Affairs.	Duarte, 2022	Online
Ivan Salati	Worked at CNEN	Salati, 2022	Online
Gladson Silva Fontes	Professor at the Military Institute of Engineering (IME)	Silva, 2022	Online
Othon Luiz Pinheiro da Silva	Vice Admiral of the Brazilian Navy. He has an outstanding importance in the conduction of the Brazilian nuclear program during the Cold War period.	Da Silva, 2022	Sent a document
Carlo Patti	Professor at Federal University of Goiás (UFG)	Patti, 2022	Online

Paulo Wrobel	Professor at Pontifical University of Rio Janeiro (PUC-Rio)	Wrobel, 2022	Online
Laércio Vinhas	Scientist who used to represent diplomatically Brazil at the IAEA.	Vinhas, 2022	Sent a document
Luiz Carlos Faria	Works at the IAEA.	Faria, 2022	Sent a document
Marco Marzo	Secretary-General of the Brazilian-Argentine Agency for Accounting and Control of Nuclear Materials (ABACC).	Marzo, 2022	Online
José Goldemberg	Ph.D. on Physical Science. Former Secretary of State for Science and Technology.	Goldemberg, 2022	Sent a document
Décio Luís Schons	Brazilian Army General who used to be the Head of Brazilian Army Technological Department.	Schons, 2022	Sent a document
Jan Ruzicka	Professor	Ruzicka, 2023	Online discussion about the Middle Power Trap
Paulo E. O. Lainetti	IPEN	Lainetti, 2022	Sent a document
Itty Abraham	Professor	Abraham, 2023	Online
Sameer Patil	Senior Fellow at ORF Mumbai	Patil, 2023	Online

Roberto Vicente	IPEN	Vicente, 2023	Sent a document
Yogesh Joshi	Professor	Joshi, 2023	Online
Renata Dalaqua	Head of the Gender and Disarmament Programme at UNIDIR	Dalaqua, 2023	Online discussion about the Middle Power Trap