

# The Impact of the U.S.–India Civil Nuclear Agreement on Nuclear Development in India

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**Abstract:** The U.S.–India Civil Nuclear Agreement, signed in 2008, marked a significant turning point in India's nuclear development. This landmark agreement ended decades of international isolation for India's civilian nuclear program, enabling access to global nuclear technology and fuel markets. By fostering collaboration with major nuclear suppliers, the deal aimed to boost India's nuclear energy capacity while reinforcing its non-proliferation commitments. This study aims to show that the U.S.–India Civil Nuclear Agreement plays a crucial role in the development of domestic energy capacity by increasing nuclear energy capacity, while also enhancing India's global status by strengthening its international legitimacy as a country with a peaceful nuclear program free from NPT restrictions. Additionally, the agreement opens access to advanced reactor technology and global markets, strengthens strategic capabilities through dual-use technology, but also presents challenges such as legal barriers, social resistance, and geopolitical risks from neighboring countries.

**Keywords:** India, United States, Cooperation, Civil Nuclear Agreement, Nuclear Development

## 1. INTRODUCTION

The United States-India Civil Nuclear Agreement, better known as the U.S.-India Civil Nuclear Agreement or the 123 Agreement, stands as one of the most significant bilateral agreements between the two nations in recent decades. Ratified in 2008, this agreement paved the way for cooperation in the civilian nuclear sector between two countries that previously had a complicated relationship concerning nuclear issues. It also reflects a strategic shift in U.S.-India relations, transitioning from a tension-dominated dynamic during the Cold War to a closer strategic partnership in the 21st century (Kapur & Ganguly, 2007).

Since its independence in 1947, India has positioned itself as a nation striving for self-reliance in nuclear technology development. Under the leadership of figures like Homi J. Bhabha, India's nuclear program advanced rapidly in the second half of the 20th century. However, India's first nuclear test in 1974, known as "Smiling Buddha," triggered international sanctions and technological isolation under the global non-proliferation regime. The United States, leading efforts to curb nuclear weapons proliferation, became one of the primary critics of India's nuclear program. India, on its part, refused to sign the Non-Proliferation Treaty (NPT), deeming it discriminatory against nations that had not yet developed nuclear weapons (Perkovich, 1999). By the 21st century, changes in global geopolitical dynamics and India's growing energy demands created opportunities for the two nations to overcome their historical differences. The United States, under President George W. Bush, viewed India as a potential strategic partner in the face of China's growing influence in Asia and other global challenges. Meanwhile, India, led by Prime Minister Manmohan Singh, saw cooperation with the United States as a way to access crucial nuclear technology and fuel to meet its rapidly increasing energy needs (Tellis, 2006).

The U.S.-India Civil Nuclear Agreement was the result of lengthy and complex negotiations encompassing technical, legal, and political aspects. A key element of the agreement was the separation of India's nuclear program into two categories: civilian and military. India agreed to place its civilian nuclear facilities under the supervision of the International Atomic Energy Agency (IAEA), while its military facilities would remain outside international oversight. In return, the

United States and other Nuclear Suppliers Group (NSG) members agreed to lift restrictions on nuclear technology and fuel trade with India. Although widely praised as a diplomatic breakthrough, the agreement faced challenges. In the United States, it met opposition from members of Congress and non-proliferation advocates who feared that granting an exception to India could undermine the global non-proliferation regime. In India, criticism came from political opposition groups and civil society, questioning whether the agreement compromised India's sovereignty in managing its nuclear program. The impact of the U.S.-India Civil Nuclear Agreement extended beyond the energy sector. It bolstered India's position as a responsible global actor and opened the door to broader cooperation in areas such as defense, technology, and trade. On the other hand, the agreement underscored the United States' commitment to supporting India's emergence as a major power in the 21st century (Sharma, 2010).

Overall, the U.S.-India Civil Nuclear Agreement symbolizes not only the transformation of U.S.-India bilateral relations but also the larger geopolitical and economic dynamics at play. In an increasingly interconnected and complex world, this agreement remains a notable example of how diplomacy can overcome historical barriers and pave the way for mutually beneficial strategic cooperation.

## 2. METHODS

This study employs a qualitative analysis method to examine data obtained from literature reviews, including books, journals, news articles, and articles from official websites related to the research variables. The author will then collect data on the various impacts of the U.S.-India Civil Nuclear Agreement on nuclear development in India, as well as the opportunities and challenges India faces in this cooperation. Subsequently, the author will analyze the findings using the concepts of national interest and bilateral cooperation to draw conclusions and answer the research questions posed.

## 3. RESULTS AND DISCUSSION

- Impact of the U.S.–India Civil Nuclear Agreement on India's Nuclear Development

The U.S.–India Civil Nuclear Agreement, also known as the 123 Agreement, signed in 2008, was a historic step in the relationship between India and the United States. This agreement opened India's access to civilian nuclear technology and nuclear fuel from the international community, despite the fact that India is not a signatory to the Nuclear Non-Proliferation Treaty (NPT). Through this agreement, India committed to separating its civilian and military nuclear facilities and placing its civilian nuclear facilities under the oversight of the International Atomic Energy Agency (IAEA). In return, India was allowed access to nuclear reactors, fuel, and technology that had previously been prohibited.

This agreement was designed to balance India's need for nuclear energy and protection against nuclear weapons proliferation. Through this agreement, the United States agreed to end its nuclear embargo on India, providing access to nuclear fuel and technology that India had previously been unable to obtain due to international sanctions. According to David C. Mulford, the agreement includes the following key points:

1. Separation of Civil and Military Programs

A key point of the agreement is the clear separation between India's civilian and military nuclear programs. India was required to declare which facilities would be used for civilian energy purposes, and 14 of its 22 nuclear reactors were placed under the oversight of the IAEA. This oversight ensures that nuclear material is not used for military purposes, reducing global concerns about potential nuclear weapons proliferation.

## 2. IAEA Oversight

As part of the agreement, India agreed to stricter inspections by the IAEA of the designated civilian facilities. This provides assurances to the international community that India's use of nuclear material is limited to civilian energy purposes and will not be diverted for its nuclear weapons program. This also helps to strengthen India's image as a responsible user of nuclear technology.

## 3. Access to Technology and Nuclear Fuel

The agreement allowed India to import nuclear technology and fuel from the United States and members of the Nuclear Suppliers Group (NSG). Before the agreement, India faced significant barriers in accessing uranium and modern reactor technology due to international sanctions. After the agreement, India was able to accelerate its domestic nuclear energy development, which was crucial to meeting the country's growing energy needs.

## 4. Non-Intervention in Strategic Programs

One key point of the agreement was the recognition of India's right to maintain its strategic nuclear program. The agreement did not require India to reduce or limit its nuclear weapons program, ensuring that India's sovereignty regarding national security matters remained intact. This was a key reason why India agreed to the deal, as the U.S. agreed not to interfere in India's military affairs.

Hans J. Morgenthau, in *Politics Among Nations* (1948), states that national interest is a fundamental principle guiding a country's foreign policy, with a focus on power and security as the main objectives. In the context of international relations, national interest encompasses the protection and achievement of strategic goals aimed at a nation's survival, prosperity, and influence. This view aligns with India's decision to agree to the Civil Nuclear Agreement with the United States. This policy demonstrates how India utilizes the principle of national interest to address domestic challenges while strengthening its position internationally.

The theory of national interest highlights that India's foreign policy in agreeing to the Civil Nuclear Agreement with the United States was primarily driven by efforts to protect and meet its strategic needs. For India, the main interest underlying the agreement was the urgent need to enhance its energy capacity. With a rapidly growing economy and an increasing demand for energy, India saw civilian nuclear technology as a solution to reduce its reliance on costly and unstable fossil fuels such as coal and oil. This technology also offers cleaner energy, in line with India's commitment to reducing carbon emissions on the global stage.

Additionally, the agreement allowed India to overcome the international isolation it had long faced due to its status as a non-signatory of the Nuclear Non-Proliferation Treaty (NPT). Through the agreement, India gained access to nuclear technology and fuel from the global market without having to relinquish its independent strategic policy on nuclear weapons. This aligns with India's national interest in maintaining autonomy in its nuclear program, both civilian and military. From a geopolitical perspective, the agreement also strengthened India's position as a major power in South Asia. By enhancing energy capacity and gaining international recognition for its nuclear program, India successfully reinforced its status as a responsible and stable nation. This recognition not only legitimized its civilian nuclear program but also expanded opportunities for cooperation with other countries such as France, Russia, and Japan. This move strengthened India's efforts to diversify its alliances while reducing dependence on a single source of technology or fuel.

The following discussion will explain two key aspects of the agreement: first, how it accelerated the development of India's domestic energy capacity; and second, its impact on India's changing global status in nuclear and geopolitical affairs.

## 1. Development of India's Nuclear Energy

One of the most tangible effects of the agreement was the increased access to better civilian nuclear technology for India. Prior to the agreement, India was under sanctions and restrictions related to nuclear technology by many countries due to its non-NPT status. However, with the U.S.–India Civil Nuclear Agreement, the embargo was gradually lifted, allowing India to acquire nuclear technology, fuel, and technical knowledge that had previously been prohibited. For India, this meant an acceleration in the development of nuclear energy capacity for its civilian needs. India now has ambitious plans to increase the share of nuclear energy in its overall energy mix, particularly as a reliable clean energy alternative. Nuclear energy is expected to reduce India's reliance on fossil fuels, particularly coal, which still dominates the country's energy production. The agreement provided India access to international nuclear fuel sources, which is crucial for supporting the growth of nuclear reactors domestically. For example, India is now able to operate and expand larger and more efficient nuclear reactor projects that were previously hindered by limitations in fuel and nuclear technology access.

This bilateral cooperation also impacted the international recognition of India's nuclear program. Before the agreement, India was regarded as a "de facto" nuclear power but was not formally recognized in the international system, mainly due to its refusal to sign the NPT. However, through the agreement with the United States, India gained greater legitimacy as a country with a peaceful nuclear program, despite remaining outside the NPT. The theory of national interest emphasizes how a country employs various means to protect and advance its objectives internationally. In this case, India not only gained technological benefits but also increased its diplomatic status on the world stage. The agreement paved the way for India to engage in civil nuclear cooperation with other countries such as France, Russia, and Japan, which had previously been reluctant to establish similar ties without U.S. approval. This legitimacy gave India access to the resources and international support necessary to continue and expand its nuclear energy program.

From a strategic perspective, the agreement has deepened the bilateral relationship between India and the United States in various fields, including trade, defense, and foreign policy. Cooperation in the nuclear sector has created a strong foundation for expanding collaboration in other areas. For instance, enhanced defense cooperation and advanced technology collaboration between the two countries occurred after the nuclear deal was agreed upon. This reflects how bilateral cooperation in one sector can create a domino effect that strengthens relations in other areas.

Overall, India successfully leveraged this agreement to enhance its position in South Asia and on the global stage. For the United States, the agreement was part of a broader strategy to make India a key strategic partner in the region, balancing China's power and maintaining stability in Asia. The agreement also shows that bilateral cooperation can create new and important alliances at the international level, particularly in the context of increasingly complex geopolitical competition.

With the growth of the nuclear energy sector supported by U.S. technology, India was able to reduce its dependence on unstable fossil fuel imports while also reducing its carbon footprint. In the framework of the theory of national interest, the development of nuclear energy reflects India's strategy to ensure energy independence and long-term economic resilience. The agreement enabled India to harness nuclear energy as a sustainable solution to meet its growing domestic energy needs. The nuclear energy program strengthened by this agreement is a crucial step in diversifying India's energy sources, reducing reliance on increasingly expensive and environmentally harmful fossil fuels. In this context, the development of nuclear energy not only supports technological interests but also becomes a key element in achieving sustainable economic and social development. This aligns with India's national priority to build a cleaner, more stable, and reliable energy system for the future of the nation.

After the agreement, India saw a surge in access to nuclear technology and fuel, supporting the development of its nuclear energy program. Before the deal, India's nuclear power generation capacity was very limited. However, after the agreement, India set a target to achieve 20 GWe of nuclear power generation capacity by 2020, though this target has still not been met.

## 2. Global Status Change of India

With this civil nuclear agreement, India not only succeeded in breaking free from international isolation but also gained greater international recognition for its status as a legitimate and responsible nuclear state. This agreement was a major step for India in securing its freedom without submitting to the restrictions of the NPT while also securing access to the nuclear technology needed for civilian energy development.

Before the Civil Nuclear Agreement, India was in a difficult position, isolated from the international community with respect to nuclear technology. Its status as a non-signatory to the NPT meant that India could not obtain advanced nuclear technology and fuel necessary to strengthen its civil nuclear program. Although India had been running its nuclear program for decades, Western countries viewed it with suspicion and often refused to collaborate on nuclear technology. Through the agreement with the United States, India gained access to the global market for nuclear technology and fuel. This was a significant breakthrough for India, granting international recognition to its nuclear program. In return, India agreed to separate its civil nuclear program from its military program, with civil nuclear installations placed under the supervision of the International Atomic Energy Agency (IAEA). This move strengthened India's status as a responsible country and built its reputation as a stable power on the global stage (Ghoshroy, 2016).

Furthermore, from a geopolitical perspective, this nuclear cooperation strengthened India's relations with the United States and other Western countries. The agreement reflects India's strategic shift towards closer ties with major Western powers while maintaining an independent foreign policy. By leveraging international recognition of its nuclear status, India expanded its influence in the Indo-Pacific region and in international forums related to nuclear security and global energy (Malone, Mohan, & Raghavan, 2015).

In addition to strengthening strategic cooperation, the civil nuclear agreement also had a positive impact on India's economy. India's access to nuclear technology and international nuclear fuel markets opened opportunities to accelerate the development of its domestic energy capacity. This became particularly important given India's growing energy needs alongside its rapidly expanding economy. By developing nuclear energy as one of its primary sources, India was able to reduce its dependence on expensive and risky fossil fuels while improving its overall energy efficiency. Moreover, this cooperation also increased the flow of Foreign Direct Investment (FDI) into India, particularly in the energy and technology sectors. High-tech companies from the United States viewed India as a potential market, especially after the agreement strengthened bilateral relations. From a national interest perspective, increasing economic cooperation with the United States allowed India to diversify its economy, strengthen its technology sector, and create new jobs across various industries (Mulford, 2024).

This civil nuclear agreement also expanded India's global role. After the agreement, India received recognition as a country with a responsible civil nuclear program, further enhancing its status in various international forums such as the International Atomic Energy Agency (IAEA). This recognition enabled India to participate in global discussions and decision-making on nuclear energy and non-proliferation, even though it remained outside the NPT. India also leveraged this new influence to strengthen cooperation with other countries, such as Japan and Australia, in the areas of energy security and maritime security in the Indo-Pacific region. By playing a more active role in regional security, India managed to expand its geopolitical influence without having to rely on the United States or other global powers. The India-U.S. Civil Nuclear Agreement has brought

about significant changes in India's global status, ending its international isolation in the nuclear field and providing recognition for its nuclear program.

- Opportunities and Challenges of the U.S.-India Civil Nuclear Agreement for India in Civil and Military Spheres

International cooperation is often influenced by the dynamics of complex bilateral relationships. In the context of U.S.-India relations, the U.S.-India Civil Nuclear Agreement represents a significant milestone that illustrates how India has formed strategic partnerships with global allies to achieve its national goals. This agreement allows India access to civil nuclear technology and nuclear fuel from the international community, despite India not being a signatory to the Nuclear Non-Proliferation Treaty (NPT). Behind the benefits of this agreement, the cooperation brings both opportunities and challenges for India, both in the civil domain, such as energy development, and in the military domain concerning the modernization of its nuclear technology.

As previously mentioned in bilateral cooperation, three main factors influence countries' decisions in selecting partners: first, good relations or cooperation with trusted countries, in line with the principle "the friend of my friend is my friend"; second, active engagement in other bilateral cooperation; and third, similarities in political, economic, or geographical characteristics (Kinne, 2013). These three factors form the foundation for determining cooperation across various fields.

In the context of the U.S.-India Civil Nuclear Agreement, these three main factors of bilateral cooperation, as outlined by Kinne, are clearly visible. First, the strong relationship between India and the United States, which has developed alongside increasing strategic trust between the two nations, became a key foundation for the agreement. The principle "the friend of my friend is my friend" is evident in this dynamic, where the close relationship between the United States and its allies, such as Japan, influenced India. Japan, as a close partner of the United States and one of India's key economic and technological partners, played a role in building trust bridges that encouraged India to strengthen its cooperation with the United States.

Second, the active engagement of the United States in fostering bilateral cooperation with various countries highlights its position as a reliable partner. For India, this cooperation was a strategic move to capitalize on the opportunities offered by a global partner with a strong track record in civil nuclear technology. This allowed India to gain access to technology and resources that were previously difficult to obtain.

Third, the shared strategic interests between the two countries, both in economic and geopolitical fields, further drove this cooperation. India and the United States have a shared vision of shaping a balance of power in the Asia-Pacific region, alongside India's need to address its domestic energy crisis through the development of civil nuclear energy. With the U.S.-India Civil Nuclear Agreement, both countries not only strengthened their bilateral relations but also supported each other in achieving their strategic objectives amidst global political dynamics.

In international relations studies, bilateral cooperation theory also provides a framework to understand how countries build mutually beneficial relationships based on strategic needs. In this case, the U.S.-India Civil Nuclear Agreement reflects India's efforts to leverage such cooperation to achieve energy independence, enhance domestic technology modernization, and strengthen its position amid regional geopolitical pressures. This cooperation provides India access to previously difficult-to-obtain technology, supports economic growth through the development of civil nuclear energy, and paves the way for increased status as a more influential regional power.

However, this cooperation also brings significant challenges. One of them is the need to manage the potential impacts of dual-use technology, which could affect regional security stability. Additionally, India must consider how to balance the benefits gained from this



cooperation with the political pressures from other international actors. The problem formulation "Opportunities and challenges of the U.S.-India Civil Nuclear Agreement for India in civil and military domains" offers a space to explore how this cooperation supports India's strategic priorities, while also examining how India utilizes and faces challenges posed by the agreement in the midst of complex international political dynamics.

## 1. Opportunities and Challenges in the Civil Sector

The U.S.-India Civil Nuclear Agreement, signed in 2008, opened significant opportunities for India in the civil sector, especially in the development of nuclear energy. These opportunities not only include the expansion of nuclear energy capacity but also the broadening of technological cooperation and access to global markets.

### a) Increase in Nuclear Energy Capacity

India, with its rapidly growing population and industrialization, requires clean and sustainable energy sources. Before the agreement, India's nuclear energy capacity was limited by technological constraints and uranium fuel supply issues. This agreement allowed India to access advanced reactor technologies and uranium fuel from Nuclear Suppliers Group (NSG) member countries, such as the U.S., Russia, and France (Sharma, 2010). As a result, India's nuclear power generation capacity grew from about 3,800 MW in 2008 to over 6,300 MW in 2022, though still far from the 20,000 MW target set for 2020 (Mulford, 2018). Furthermore, by utilizing modern reactor technologies like Pressurized Water Reactors (PWR), India was able to operate more efficient plants, pushing the diversification of its energy mix, which was previously heavily reliant on coal, while also reducing carbon emissions globally (Ghoshroy, 2016).

### b) Technology Transfer and Infrastructure Development

Cooperation with advanced nations provided India with access to cutting-edge nuclear technologies that were previously difficult to obtain. Through this agreement, the U.S. agreed to share relevant technologies, including reactor safety systems, nuclear waste management, and next-generation reactor designs. This capability not only enabled India to boost energy production but also strengthened its domestic nuclear infrastructure. Major infrastructure projects like the power plants at Kovvada and Kudankulam show technological collaboration between India and international partners, including the U.S. and Russia. India also had the opportunity to build local supply chains in nuclear technology, which could create thousands of jobs in engineering and manufacturing (Mulford, 2024).

### c) Access to Global Markets

This agreement positioned India strategically as a trusted trading partner in the global nuclear sector. Prior to the agreement, India faced barriers in obtaining nuclear technology and fuel because it had not signed the NPT. However, after 2008, the NSG granted India a special exemption to trade with other NSG members without the obligations of the NPT. India now has the opportunity to sell nuclear technologies and components to developing countries in need of clean energy. By developing low-cost reactor technologies, India could become a leading exporter in the nuclear sector, strengthening its global economic position (Sharma, 2010). However, while offering strategic and diplomatic benefits, the agreement also presents several significant challenges in the civil sector, particularly regarding legal, technical, and social frameworks.

### d) Legal and Regulatory Framework: The CLND Act of 2010

One of the major challenges India faced after the agreement was adjusting its domestic legal framework to meet international obligations. The passage of the Civil Liability for Nuclear Damage (CLND) Act in 2010 created significant hurdles, as this law gave operators the right to seek compensation from suppliers in case of nuclear accidents. This provision differs from

international standards, such as the Convention on Supplementary Compensation for Nuclear Damage (CSC), which limits supplier liability. As a result, many foreign companies were reluctant to invest in nuclear projects in India. This liability provision became controversial because it was seen as burdensome to suppliers, whereas other countries typically protect suppliers from legal claims. For instance, U.S. companies such as Westinghouse and GE delayed or canceled their investment plans, hindering India's nuclear infrastructure development (Sharma, 2010).

e) Infrastructure and Technology Issues

India faced significant challenges in building suitable nuclear infrastructure to support the expansion of nuclear energy. Most of India's nuclear reactors use domestic technologies that are not always compatible with the international designs offered by foreign partners. While the agreement allowed India to access advanced technology, the process proved time-consuming and costly. Furthermore, the limited domestic manufacturing capacity for critical reactor components, such as pressure vessels, became a barrier. India still relies on imports for many important components, which often slows the implementation of projects due to logistical and financing challenges (Mulford, 2024).

f) Political and Social Resistance

Nuclear energy projects often face strong social resistance at the local level. For example, the construction of nuclear reactors in Kudankulam, Tamil Nadu, faced large-scale protests from the public, concerned about safety risks and environmental impacts. Similar protests occurred at other sites, resulting in delays in project implementation. Politically, some domestic groups viewed the agreement as an attempt by the U.S. to expand its strategic influence in the region. They felt that India was sacrificing too much of its sovereignty by accepting greater international oversight of its nuclear program (Sharma, 2010).

2. Opportunities and Challenges in the Military Sector

The U.S.-India Civil Nuclear Agreement, signed in 2008, not only covered civil nuclear energy but also provided significant strategic opportunities in the military realm. This agreement marked a paradigm shift in the relationship between the two countries, with widespread implications for India's military capabilities and the geopolitical dynamics of South Asia and its surroundings.

a) Technology Transfer and Nuclear Infrastructure

One major impact of this agreement was India's access to advanced nuclear technology that was previously limited. Although the agreement was formally focused on the civil sector, advancements in civil nuclear technology could indirectly enhance military capabilities. The facilities and technologies acquired through this agreement could accelerate the research and development of advanced nuclear weapons, including smaller warhead designs for tactical battlefield use. Militarily, this provides India with strategic flexibility. By strengthening nuclear infrastructure and potentially utilizing dual-use technology (technology that can be used for both civilian and military purposes), India has opportunities to enhance its nuclear arsenal. This is especially important in the context of deterrence strategies against neighboring countries like China and Pakistan (Sharma, 2010).

b) Increased Military Cooperation with the United States

This agreement paved the way for enhanced military relations between India and the United States. In the years following the agreement, both countries signed several key accords, including the Logistics Exchange Memorandum of Agreement (LEMOA) and the Communications Compatibility and Security Agreement (COMCASA). While these agreements are not directly related to nuclear matters, they signify an increased level of strategic trust that could facilitate further cooperation in maritime security, military exercises, and intelligence sharing. These opportunities strengthen India's position as a key partner for the U.S. in the



Indo-Pacific region, a region central to the U.S. military strategy of counterbalancing China's growing influence (Mulford, 2024).

c) Regional Stability and Geopolitical Impact

The U.S.-India Civil Nuclear Agreement also provided India an opportunity to enhance its global standing, including in international security dialogues. With India's acceptance into the Nuclear Suppliers Group (NSG) through U.S. support, India gained full access to nuclear fuel and technologies that were previously only available to countries with a good non-proliferation reputation. While this does not directly target the military domain, energy stability and increased international trust in India provided a foundation for the country to reallocate resources to military capability development. Geopolitically, India leveraged its new position to expand its influence in South Asia, counter China's expansionist policies, and maintain stability along its border with Pakistan (Mulford, 2024).

However, this agreement also presents various military challenges that cannot be ignored, especially in the context of national security, defense technology development, and regional strategic relations.

d) Limitations on the Use of Nuclear Technology for Military Purposes

This agreement placed India under stricter international scrutiny concerning the use of nuclear technology. A key clause in the agreement was the separation of civil and military nuclear facilities. India was required to classify its reactors into civilian or military categories, with only civilian facilities being monitored by the International Atomic Energy Agency (IAEA). Challenges arose because this separation could hinder India's ability to utilize nuclear technology for strategic defense needs. Additionally, there were concerns that IAEA oversight of civilian facilities might inadvertently provide information to other countries, including regional competitors like Pakistan and China (Sharma, 2010).

e) Dependency on Technology Imports

Through this agreement, India gained access to advanced nuclear technology, but this also created long-term challenges. Dependency on imported technologies from the U.S. and other partners could limit India's strategic autonomy. In the event of geopolitical changes or a breakdown in bilateral relations, India could face significant hurdles in accessing these technologies, which in turn could impact the modernization of its military capabilities (Sharma, 2010).

f) Changes in Regional Relations

This agreement indirectly triggered instability in South Asia. Pakistan, for instance, viewed this agreement as a threat as it strengthened India's nuclear capacity, both for civil and military purposes. In response, Pakistan accelerated the development of tactical nuclear weapons and deepened its military cooperation with China. Moreover, this agreement influenced the strategic dynamics in the trilateral relationship between India, China, and the United States, where India had to balance the benefits of cooperation with the U.S. while maintaining stable relations with China (Mulford, 2024).

#### 4. CONCLUSION

In conclusion, the U.S.–India Civil Nuclear Agreement has had a significant impact on India, particularly in the areas of energy, geopolitical status, and strategic cooperation. This agreement helped India end its international isolation in the nuclear sector while strengthening its position as a global power.

From the perspective of national interest theory, the agreement supports two key elements for India: the development of domestic energy capacity and the enhancement of global status. Access to technology and international nuclear fuel enabled India to increase its nuclear power

generation capacity from 3.8 GWe in 2008 to 6.29 GWe in 2023, helping to meet the growing energy demand while reducing dependence on fossil fuels and carbon emissions. Additionally, this agreement reinforced India's international legitimacy as a country with a peaceful nuclear program, without being subject to the restrictions of the Nuclear Non-Proliferation Treaty (NPT), thereby strengthening its position as a responsible global actor and opening opportunities for strategic cooperation with countries like Russia, Japan, and France.

The theory of bilateral cooperation is relevant for analyzing the opportunities and challenges arising in the civil and military sectors within the context of this agreement. In the civil sector, the agreement opened access for India to advanced reactor technologies, uranium fuel, and previously closed global markets, enabling the development of more modern and efficient nuclear energy infrastructure to diversify national energy sources. However, challenges such as legal obstacles in the Civil Liability for Nuclear Damage (CLND) Act 2010, social resistance to nuclear projects, and limitations in domestic manufacturing capacity must be addressed in order to maximize the benefits of this agreement. In the military sector, the agreement indirectly enhances India's strategic capabilities through access to dual-use technology, strengthening national defense capabilities, despite international oversight. However, geopolitical risks such as reactions from Pakistan and China, which view the agreement as a threat to the balance of power in South Asia, as well as dependency on imported technology and the obligation to separate civil and military programs, represent challenges that could limit India's flexibility in utilizing nuclear technology advancements.

Overall, the U.S.–India Civil Nuclear Agreement is a strategic step that reflects India's ability to combine national interest theory and bilateral cooperation theory in building domestic advantages while enhancing international influence. Through the development of nuclear energy and the enhancement of global status, India has successfully asserted its strategic independence. On the other hand, the opportunities arising from this cooperation, both in the civil and military sectors, provide a vital foundation for India to face regional and global challenges in the future. Thus, this agreement marks a significant achievement in India's journey towards sustainable progress and strategic independence.

## 5. References

- Ahmad, N. (1980). Recent developments in Indian foreign policy. *Pakistan Horizon*, 33(3), 47–95. Pakistan Institute of International Affairs.
- Aron, R. (2003). *Peace and war: A theory of international relations*. Transaction Publishers.
- Arms Control Association. (2024, July). Nuclear weapons: Who has what at a glance. <https://www.armscontrol.org/factsheets/nuclear-weapons-who-has-what-glance>
- Bainus, A., & Rachman, J. B. (2018). Editorial: Kepentingan nasional dalam hubungan internasional. *Intermestic: Journal of International Studies*, 2(2), 109–115.
- Basri, T. H. (2014). Sejarah dan Perkembangan Senjata Nuklir. *Seuneubok Lada*, Vol. 2(1), 96-105.
- Blix, H. (1987). The Role of the International Atomic Energy Agency. *Energy Exploration & Exploitation*, Vol. 5(5/6), 487-497.
- Buzan, B., & Waever, O. (2003). *Regions and powers: A guide to the global security order*. Cambridge University Press.
- Cable News Network. (1998, May 13). India and the U.S. CNN. Retrieved June 30, 2023, from <https://web.archive.org/web/20230630050930/http://www.cnn.com/WORLD/asiapcf/9805/13/india.us/>
- Chengappa, R. (2000). *Weapons of peace: The secret story of India's quest to be a nuclear power*. Harper Collins Publishers.

- Chossudovsky, E. M. (1990). The Origins of the Treaty on the Non-Proliferation of Nuclear Weapons: Ireland's Initiative in the United Nations. *Irish Studies in International Affairs*, Vol. 3(2), 134-135.
- Cirincione, J. (2007). *Bomb Scare: The History and Future of Nuclear*. Columbia University Press.
- Cleo Abram.[Cleo Abram]. (2023, January 18). Everything "nuclear" explained in 1 chart [YouTube short]. YouTube. [www.youtube.com/shorts/sSmVVDxrc2Y](https://www.youtube.com/shorts/sSmVVDxrc2Y)
- Cohen, S. P. (2001). *India: Emerging power*. Brookings Institution Press.
- Dougherty, J. E., & Pfaltzgraff Jr. R. L. (2000). *Contending Theories of International Relations: A Comprehensive Survey*. Pearson.
- Epstein, W. (1984). *The Prevention of Nuclear War: A United Nations Perspective*. Oelgeschlager, Gunn & Hain Publisher.
- Freedman, L. D. (2023). Treaty on the Non-Proliferation of Nuclear Weapons. In *Encyclopedia Britannica*. Retrieved from <https://www.britannica.com/event/Treaty-on-the-Non-proliferation-of-Nuclear-Weapons>
- Galindo, A. (2022, November 15). What is Nuclear Energy? The Science of Nuclear Power. Retrieved from IAEA: [www.iaea.org/newscenter/news/what-is-nuclear-energy-the-science-of-nuclear-power](https://www.iaea.org/newscenter/news/what-is-nuclear-energy-the-science-of-nuclear-power)
- Ganguly, S., & Mason, M. C. (2021). *The future of U.S.-India security cooperation*. Manchester University Press.
- Ganguly, S. (2024). *The Oxford Handbook of Indian Politics*. Oxford University Press.
- Ghoshroy, S. (2016, February). Taking stock: The US-India nuclear deal 10 years later. *Bulletin of the Atomic Scientists*. Retrieved from <https://thebulletin.org/2016/02/taking-stock-the-us-india-nuclear-deal-10-years-later/>
- Gowa, J. (1999). *Ballots and Bullets: The Elusive Democratic Peace*. Princeton University Press.
- Grieco, J. M. (1988). Realist Theory and the Problem of International Cooperation: Analysis with an Amended Prisoner's Dilemma Model. *The Journal of Politics*, 50(3), 600-624.
- IAEA. (2013, March 22). The IAEA and the Non-Proliferation Treaty. Retrieved from IAEA: <https://www.iaea.org/topics/non-proliferation-treaty>
- IAEA. (2016, August 26). History. Retrieved from IAEA: <https://www.iaea.org/about/overview/history>
- IAS Toppers. (2023). Liberation of Goa. Retrieved October 30, 2024, from <https://iastoppers.com/landing/web-stories/liberation-of-go/>
- Jervis, R. (1976). *Perception and misperception in international politics*. Princeton, NJ: Princeton University Press.
- KINNE, B. J. (2013). Network Dynamics and the Evolution of International Cooperation. *The American Political Science Review*, 107(4), 766–785.
- Keohane, R. O., & Nye, J. S. (1977). *Power and Interdependence: World Politics in Transition*. Boston: Little, Brown.
- Kerttunen, M. (2009). *A responsible nuclear weapon power: Nuclear weapons and Indian foreign policy*. Helsinki: National Defense University, Department of Strategic and Defence Studies.
- Kumar, A.V. (2014). *India and the Nuclear Non-proliferation Regime*. Cambridge University Press.
- Kux, D. (1993). *India and the United States: Estranged democracies, 1941–1991*. National Defense University Press.
- Kux, D. (2001). *The United States and Pakistan, 1947-2000: Disenchanted allies (The ADST-DACOR diplomats and diplomacy series)*. Woodrow Wilson Center Press.
- Mahaffey, J. A. (2011). *The History of Nuclear Power*. Facts On File.
- Malone, D. M., Mohan, C. R., & Raghavan, S. (Eds.). (2015). *The Oxford handbook of Indian foreign policy*. Oxford University Press.

- McGarr, P. M. (2013). *The cold war in South Asia: Britain, the United States and the Indian subcontinent, 1945-1965*. Cambridge University Press.
- McMahon, R. (1994). *The cold war on the periphery: The United States, India and Pakistan*. Columbia University Press.
- Mearsheimer, J. (2001). *The tragedy of great power politics*. New York, NY: W.W. Norton & Company.
- Milner, H. (1992). Review: International Theories of Cooperation among Nations: Strengths and Weaknesses. *World Politics*, 44(3), 466-496.
- Morgenthau, H. J. (1948). *Politics among nations: The struggle for power and peace*. Alfred A. Knopf.
- Mulford, D. C. (2024). *Forging trust with India: The dramatic story of achieving the US-India civil nuclear agreement*. Hoover Institution Press.
- National Security Archive. (2018, October 29) 60th Anniversary of Irish Resolution: A Forerunner of the NPT. Retrieved from National Security Archive: [www.nsarchive.gwu.edu/briefing-book/nuclear-vault/2018-10-29/60th-anniversary-irish-resolution-forerunner-npt](http://www.nsarchive.gwu.edu/briefing-book/nuclear-vault/2018-10-29/60th-anniversary-irish-resolution-forerunner-npt)
- Nuechterlein, D. E. (1976). National interests and foreign policy: A conceptual framework for analysis and decision-making. *British Journal of International Studies*, 2(3), 246-266.
- Office Of the Historian. (2008, June 12). *The Nuclear Non-Proliferation Treaty (NPT), 1968*. Retrieved from Office Of the Historian: <https://history.state.gov/milestones/1961-1968/npt>
- Penney, L. (1967). Homi Jehangir Bhabha. *Biographical Memoirs of Fellows of the Royal Society*, Vol. 13, 35-55.
- Perkovich, G. (1999). *India's nuclear bomb: The impact on global proliferation*. University of California Press.
- Pilat, J. F., & Pendley, R. E. (1995). *A New Beginning For the NPT*. Springer Science+Business Media.
- Poulose T. T. (1979). INDIA AND THE NUCLEAR SAFEGUARDS CONTROVERSY. *India Quarterly*, Vol. 35(2), 153-162.
- Power, P. F. (1979). *The Indo-American nuclear controversy*. Asian Survey, 19(6), 574-596. University of California Press.
- Putnam, R. D. (1988). Diplomacy and domestic politics: The logic of two-level games. *International Organization*, 42(3), 427-460.
- Rifki, Ahmad Z S. (2010). *Kepemilikan senjata nuklir India Pakistan: Melihat kemungkinan terjadinya perang nuklir antara keduanya*. (Skripsi Sarjana, Universitas Indonesia). <https://lontar.ui.ac.id/detail?id=20313470&lokasi=lokal>
- Roehrich, E. (2022). *Inspector of peace: A History of the International Atomic Energy Agency*. Johns Hopkins University Press.
- Sarkar, J. (2022). *Ploughshares and Swords: India's Nuclear Program in the Global Cold War*. Cornell University Press.
- Singh, P.K. (2015). The India-Pakistan Nuclear Dyad and Regional Nuclear Dynamics. *Asia Policy*, Vol. 19, 37-44.
- Sinnot, R. (1995). Ireland and the Diplomacy of Nuclear Non-Proliferation: The Politics of Incrementalism. *Irish Studies in International Affairs*, Vol. 6, 59-78.
- Smith, J. (2019). *Bilateral agreements and international cooperation*. Oxford, UK: Oxford University Press.
- Smith, M. A. (2000). *NATO enlargement during the Cold War: Strategy and system in the Western alliance*. Palgrave Macmillan.
- UN. (2021, February 14). *Tenth Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons Background*. Retrieved from United Nations: <https://www.un.org/en/conferences/npt2020/background>

- UN. (2021, February 14). Tenth Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons. Retrieved from United Nations: <https://www.un.org/en/conferences/npt2020>
- Waltz, K. N. (1990). Nuclear Myths and Political Realities. *The American Political Science Review*, Vol. 84(No. 3), 743.
- Waltz, K. N. (2001). *Man, the State, and War: A Theoretical Analysis*. Columbia University Press.
- Weart, S. R. (1989). *Nuclear Fear: A History Of Image*. Harvard University Press.
- Weiss, L. (2010). India and the NPT. *Strategic Analysis*, 34(2), 255–271. <https://doi.org/10.1080/09700160903537856>
- White, J. T. (2021). After the foundational agreements: An agenda for US-India defense and security cooperation. Brookings.
- World Nuclear Association. (2020, November). Outline History of Nuclear Energy. Retrieved from World Nuclear Association: <https://world-nuclear.org/information-library/current-and-future-generation/outline-history-of-nuclear-energy.aspx>
- World Nuclear Association. (2024). India - Reactor database. Retrieved November 1, 2024, from <https://world-nuclear.org/nuclear-reactor-database/summary/India>
- World Nuclear Association. (2024). Nuclear power in India. Retrieved November 3, 2024, from <https://world-nuclear.org/information-library/country-profiles/countries-g-n/india>