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Iran's Nuclear Program: A Contentious Discourse

Iran's Nuclear Program: A Contentious Discourse

Zafar Nawaz Jaspal [*]

Abstract

The rationale for Iran's withdrawal from the Nuclear Non-proliferation Treaty (NPT) and nuclearization appears more realistic than ever due to the rapid transformation in its geostrategic environment. However, the Iranian ruling elites seem sensitive to the fact that overt nuclearization may prove counterproductive. Therefore, it pursues a balanced nuclear policy by improving latent nuclear weapons potential without withdrawing from the NPT. The alarming riddle is Israel's Premier, Benjamin Netanyahu's endeavor to establish a new order in the Middle East with the connivance of the United States (US) through military might, which may constitute Iran's final incentive to cross the nuclear threshold. Iran's noncompliance with the International Atomic Energy Agency (IAEA) implies that Iranian leadership is contemplating its nuclearization's future course of action.

Keywords: Iran, nuclearization, IAEA, uranium enrichment, Middle East, Trump 2.0

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Introduction

The Middle Eastern geostrategic landscape is undergoing rapid transformation due to the Israel-Palestinian war in Gaza, Israeli military operations in Lebanon, and the escalating conflict between Iran and Israel. Since September 2023, heightened nuclear signaling by the Israeli leadership and the exchange of strikes between Tehran and Tel Aviv have the probability of a shift in Iran's current nuclear policy. Emerging trends on the regional strategic chessboard could push Tehran to transition from a latent nuclear status to overt nuclearization. The rationale for Iran's weaponization of its nuclear program has become more compelling than ever, driven by its need to restore a balance of deterrence with its longstanding adversaries, the United States and Israel.

While Iran's overt nuclearization may reestablish a deterrence equilibrium between Tel Aviv and Tehran. First, it could trigger a domino effect, encouraging Saudi Arabia and other Middle Eastern states to pursue nuclear weapons development. Second, Tehran's decision to develop nuclear weapons would escalate its hostility with the US. In this context, Antony J. Blinken, the US Secretary of State, stated:

> "We demonstrated to Iran that there was a path back to a mutual return to compliance—if Iran was willing to take it—while maintaining a robust sanctions regime and our commitment that Iran will never be permitted to obtain a nuclear weapon." [1]

In response, Iran would likely face severe Western secondary sanctions, economic coercion, and further isolation. Third, a nuclear-armed Iran would embolden the resistance axis—Hamas, Hezbollah, and the Houthis—to further its geopolitical objectives in the Middle East. Fourth, Iran's nuclear threshold crossing would challenge Israel's efforts to establish a new Middle Eastern order through military means. Israel aims to dismantle the Iranian regime's network of allies and proxies—the axis of resistance—with Hezbollah as a central component.[2]

1. Antony J. Blinken, "Rebuilding Leadership for a New World," *Foreign Affairs*, Volume 103, Number 6, November-December 2024, p. 67.
2. Maha Yahya, "Lebanon's Day After: Will the Country Survive the War With Israel?" *Foreign Affairs* November 20, 2024. https://www.foreignaffairs.com/lebanon/lebanons-day-after

Finally, Iran's overt nuclearization would credibly deter detrimental covert and overt actions by Israel, the US, and their Middle Eastern regional partners. Western nations led by the US have provided gigantic political, economic, diplomatic and military support to Tel Aviv in the war. Iran's rapid advancement in pursuing a nuclear weapon would compel the US to deepen its involvement in Israel's wars. As Carrie Lee highlights "Israel's strategy is a familiar one. Weaker partners in an alliance will always seek to transfer the risk of escalation onto the stronger partner, a phenomenon that political scientists call 'moral hazard.'" [3]

A second Trump Administration is likely to adopt a tougher stance against Iran, intensifying Washington's opposition to Tehran's nuclear and missile development projects, as well as its influence in the Middle East. Besides, it will continue to provide robust financial and diplomatic support to Israel. It continues promoting Israel's interests in the United Nations (UN), its affiliates, and other global organizations. Thus, Trump Administration 2.0 pro-Israel policies would encourage and further harden Israel's hostile policies towards the Axis of resistance and Iran.

Hitherto, the US robust support of Israel's covert and overt aggression in the region has not intimidated Iran. Therefore, Tehran has refrained from overt nuclearization, which is imperative to deter the nuclear-armed adversary. The continuation of Biden's current Middle Eastern policy under a Trump Administration 2.0 could heighten the likelihood of Iran developing and testing nuclear weapons.

Consequently, there is a greater chance of horizontal nuclear proliferation which could lead to heightened tensions in the Middle East. These developments raise four interlinked questions: What is the present state of Iran's nuclear program? Why has the international community been unsuccessful in limiting Iran's uranium enrichment? How did the tit-for-tat strikes between Iran and Israel drive Iran's nuclear posture? What are the likely consequences of the shift in Iran's nuclear posture? To answer these questions, the article is organized into seven parts.

3. Carrie A. Lee, "The Paradox of Israeli Deterrence: How a Campaign Against Hezbollah Could Lower Iran's Inhibitions," *Foreign Affairs*, November 19, 2024. https://www.foreignaffairs.com/united-states/paradox-israeli-deterrence

The first part provides a brief overview of the development of Iran's nuclear program. The second part discusses Iran's clandestine enrichment of uranium since the beginning of twenty-first century. The third part explains the diplomatic initiatives and United Nations Security Council (UNSC) resolutions to discourage Tehran's uranium enrichment endeavors. The fourth part elaborates on the Joint Comprehensive Plan of Action (JCPOA). The fifth part elucidates the mistrust between the International Atomic Energy Agency (IAEA) and Tehran. The sixth part sheds light on Iran and Israel's tit-for-tat military strikes and their potential implications for the Iranian nuclear policy. The final part contemplates the probability of Iran's overt nuclearization and expected horizontal proliferation in the Middle Eastern region.

The Evolution of Iran's Nuclear Program

In the late 1950s, Iran began its nuclear program with the aim of pursuing peaceful purposes. Over the past four decades, its nuclear capabilities have steadily advanced.[4] In the mid-1980s, a significant turning point occurred when Tehran undertook efforts to revitalize its scientific and technological foundation, including its civilian nuclear energy program. In order to achieve its objectives, Tehran signed long-term cooperation agreements with China in 1990 and Pakistan in 1987 with the aim of training nuclear professionals and offering technical assistance, and it sent several students abroad for nuclear training. However, both countries eventually withdrew from these agreements under pressure from the US.[5]

With the notable exception of Russia, the US was able to block Iran's lawful acquisition of nuclear technology and materials from the Nuclear Suppliers Group (NSG). This forced Iran to rely on the clandestine nuclear marketplace to advance its uranium enrichment project. Iran managed to acquire nuclear materials, including Zippe centrifuges, uninterruptedly from the European market, largely because many of the items they needed had dual-use applications.

4. The work on uranium enrichment in Iran was initiated in the mid-1980s. Mark Fitzpatrick, "Iran's Nuclear, Chemical and Biological Capabilities—A net assessment," *Strategic Dossiers*, Executive Summary (London: The International Institute for Strategic Studies, February 3, 2011), p. 1.
5. Shannon N. Kile, "The controversy over Iran's nuclear program," in Shannon N. Kile, ed. *Europe and Iran Perspectives on Nonproliferation,* SIPRI Research Report, No. 21 (Oxford: Oxford University Press, 2005), p. 2.

For example, Degussa, one of Germany's largest chemical companies and a key player in the nuclear weapons materials industry, supplied Iran with Zippe centrifuges.[6] As Jeremy Bernstein pointed out: "The Degussa representatives made it clear that they did not care if the Iranians were going to use the material to make weapons. That was fine with them as long as they paid their bills."[7]

The Europeans have assisted Iran in building its civil nuclear program under the IAEA's comprehensive safeguards program for peaceful purposes. In parallel, the US' pressure policies have increased Tehran's technological dependency on Russia for Bushehr 1000 MWe light-water power reactor completion. In 1974, the German firm Siemens (then KraftWerk) inaugurated the Bushehr nuclear power plant close to Bushehr on the Persian Gulf. Moscow and Tehran signed a deal in 1994 to construct the VVER 1000 MWe light-water reactor.[8] The project materialized in 2005, driven by Vladimir Putin's efforts to align Russian foreign policy with Russian nationalism and national interests rather than US geopolitical priorities.[9] Construction on the Bushehr reactor commenced in 2006.[10] Notably, Moscow intermittently paused construction, citing technical issues; however, these delays were actually responses to Washington's concerns about the project.[11]

Skepticism Surrounding Iran's Nuclear Program

Since the early 21st century, Iran's nuclear program has faced intense international scrutiny. The US and European countries accused Iran of noncompliance with its obligations as a member of the NPT. Although the Iranian ruling elite consistently assured the international community that it was not developing nuclear weapons, a series of events indicated that Tehran was continuing its clandestine uranium enrichment activities.

6. Jeremy Bernstein, *Nuclear Weapons: What you need to know* (New York: Cambridge University Press, 2008), pp. 263, 266.
7. Jeremy Bernstein, *Nuclear Weapons: What you need to know*, Op. cit., p. 263.
8. "Nuclear Energy in Iran," World Nuclear Association, www.world-nuclear.org.
9. "Iran's Nuclear Program and the West," *Third World Quarterly*, Vol. 27, No. 4, 2006, p. 649.
10. Shannon N. Kile, "The controversy over Iran's nuclear program," Op. cit., pp. 2-3.
11. Dmitri Trenin and Alexey Malashenko, "Iran: A View From Moscow," Washington: *Carnegie Endowment for International Peace*, 2010, p. 21. http://carnegieendowment.org/files/iran_view_moscow.pdf.

In August 2002, revelations emerged regarding the clandestine establishment of a uranium enrichment plant at Natanz, located 130 miles south of Tehran, in addition to a heavy water producing facility close to Arak. This revelation heightened skepticism about the pursuit of a covert nuclear weapons program by Iran. After conducting an investigation, the IAEA verified that Iran had engaged in clandestine fissile material production activities for eighteen years, in violation of its responsibilities under nonproliferation agreements. By 2003, it became evident that Iran's uranium enrichment program was significantly more advanced than initially suspected.[12]

Proliferation experts from the United States and Europe concluded that the 40 MWt heavy-water research reactor (IR-40) and related heavy-water production plant under construction at Arak were supposedly for civilian use. Its type and scale, however, were quite similar to reactors that manufacture plutonium for nuclear bombs in Israel, Pakistan, and India.[13]

A nuclear arms race in the Middle East, a threat to European security, and pressure on Israel to renounce its nuclear ambiguity policy are all possible outcomes of Iranian nuclear weapons, according to European authorities. They contended that Iranian nuclear weapons may pose a direct threat to European security when combined with medium- and long-range missiles. For example, the 2,000-kilometer-range Iranian Shahab-3 ballistic missile can reach portions of Southeastern Europe.[14] The way Iran was portrayed in the West influenced Europe's view of the country as a threat. As Adam Tarock noted: "The image of the Islamic Republic of Iran in the West has for more than two-and-a-half decades been painted in black, simply ugly and demonic. It has been called a 'rogue' and 'outlaw' state and, more recently, 'evil,' conjuring up mythical monsters."[15]

12. Robert J. Einhorn, "A Transatlantic Strategy on Iran's Nuclear Program," *The Washington Quarterly*, Autumn 2004, pp. 21-22.
13. Mark Fitzpatrick, "Iran's Nuclear, Chemical and Biological Capabilities—A net assessment," Op. cit., pp. 1-12.
14. Oliver Thranert, "Ending Suspicious Nuclear Activities in Iran: Discussing the European Approach," Presentation at *Brandeis University*, Boston, November 18, 2004, p. 1. http://www.swp-berlin.org/fileadmin/contents/products/arbeitspapiere/trt_brandeispaper_november_04_ks.pdf, accessed on March 13, 2011.
15. Adam Tarock, "Iran's Nuclear Program and the West," Op. cit., p.654.

President Mohammad Khatami announced in February 2003 that Iran will create a full nuclear fuel cycle, which would include waste management, spent fuel reprocessing, and the mining and processing of uranium ore for nuclear power reactors.[16] After decades of being concealed from international scrutiny, Iran's nuclear program was much more extensive and sophisticated than previously believed, according to a report delivered to the IAEA Board by then-Director General Mohamed ElBaradei on November 10, 2003.[17]

The unearthing of A.Q. Khan's network in 2004 and subsequent revelations about Iran intensified suspicions regarding its nuclear weapons ambitions. The NPT Additional Protocol, which had given IAEA inspectors greater access to Iran's nuclear facilities, was terminated by Tehran in 2006 as a result of these developments. Concerns over Iran's NPT violations grew worldwide in 2009 after the discovery of a covert enrichment plant at Fordow. This reinforced the perception that Iran had a highly advanced nuclear enrichment program. In April 2006, then-President Mahmoud Ahmadinejad shocked the world by proclaiming Iran's enterance into the "nuclear technology club" after successfully enriching uranium to 3.5%.[18] The Director General of the IAEA stated on November 23, 2010: Based on its analysis of all the information available to it, the Agency remains concerned about the possible existence in Iran of past or current undisclosed nuclear-related activities involving military-related organizations, including activities related to the development of a nuclear payload for a missile. Certain of these activities may have continued beyond 2004.[19]

On February 16, 2011, James Clapper, the US Director of National Intelligence, updated the Senate Select Committee on Intelligence, "Iran is keeping open the option of developing nuclear weapons through the pursuit of various nuclear capabilities but the intelligence community does

16. Shannon N. Kile, "The controversy over Iran's nuclear program," Op. cit., p. 5.
17. The controversy over Iran's nuclear program," p. 8.
18. Adam Tarock, "Iran's Nuclear Program and the West," Op. cit., p. 646.
19. Report by the Director General, "Implementation of the NPT Safeguards Agreement and relevant provisions of Security Council resolutions in the Islamic Republic of Iran," *IAEA Board of Governors*, November 23, 2010, p. 7. http://www.iaea.org/Publications/Documents/Board/2010/gov2010-62.pdf

not know if Iran will eventually decide to build nuclear weapons."[20] Additionally, he said, the intelligence community has determined that Iran "is technically capable of producing enough highly enriched uranium (HEU) for a weapon within the next few years if it chooses to do so."[21] Despite numerous UNSC resolutions urging Tehran to stop enriching low-enriched uranium (LEU) at its Natanz Fuel Enrichment Plant and building the IR-40 heavy-water nuclear research reactor at Arak, Iran was still doing so, according to an IAEA report released on February 25, 2011.[22]

Yukiya Amano, the Director General of the IAEA at the time, reiterated the Agency's stance on March 7, 2011, stating: "Full implementation by Iran of its binding obligations is needed to establish international confidence in the exclusively peaceful nature of Iran's nuclear program." He further said, "I request Iran to take steps towards fully implementing its Safeguards Agreement and its other obligations."[23] Western nations increased their pressure on Iran to stop its uranium enrichment program as a result of these declarations and reports. Iran forcefully rejected assertions by the US and Western nations that it intended to become a nuclear-weapon state or violates its NPT obligations.[24] At the same time, it admitted to not promptly reporting certain advancements in its nuclear program to the IAEA.[25]

Iranian leaders contended that a nuclear weapons program is forbidden both by their religious principles and by Iran's commitments under the NPT. Ayatollah Ali Khamenei, the supreme leader of Iran, issued a fatwa, or religious decision, that specifically forbade the creation and application of nuclear weapons. By emphasizing the necessity of developing a civilian nuclear energy capacity, Iran defends its expanding domestic nuclear prog-

20. Peter Crail, "US Updates Iran Assessment," *Arms Control Today*, March 2011. http://www.armscontrol.org/act/2011_03/Iran
21. "US Updates Iran Assessment."
22. "IAEA Obtains New Details on Potential Iranian Nuke Work," *Global Security Newswire*, February 25, 2011. http://www.globalsecuritynewswire.org/gsn/nw_20110225_9165.php
23. Mr. Yukiya Amano, "IAEA Director General, "Introductory Statement to Board of Governors," *IAEA Board of Governors*, Vienna: March 7, 2011. http://www.iaea.org/newscenter/statements/2011/amsp2011n005.html
24. Mustafa Kibaroglu's "Good for the Shah, Banned for the Mullahs: The West and Iran's Quest for Nuclear Power," *The Middle East Journal*, Vol. 60, No. 2,Spring 2006, p. 210.
25. "Good for the Shah, Banned for the Mullahs: The West and Iran's Quest for Nuclear Power."

-ram and enables it to export oil and gas earnings that would otherwise be utilized to meet domestic energy needs. Tehran cited Article IV of the NPT, which gives member countries the freedom to produce nuclear energy for peaceful purposes, to support the development of various nuclear energy installations.

Diplomacy in Action: The Role of the UNSC

The Europeans adopted a diplomatic and incentive-based approach, rather than a threatening or military coercive strategy, to hinder Iran's ability to acquire nuclear fuel cycle capabilities. France, the United Kingdom (then an EU member), and Germany (EU-3) have been the main representatives of the European Union on Iran's nuclear program since 2003. They acted as intermediaries between Tehran and Washington. As Dmitri Trenin and Alexey Malashenko noted, "They used to act as proxies in Iran's dialogue with the West when the United States refused to deal with Iran directly."[26]

In order to find a peaceful solution and convince Tehran to stop its uranium conversion, enrichment, and plutonium reprocessing activities, the EU-3 initiated a number of diplomatic attempts.[27] They offered further collaboration with Iran on October 21, 2003, in return for its pledge to abide by the IAEA's Additional Protocol and to stop all efforts to construct a complete nuclear fuel cycle.[28] Tehran then consented to halt all enrichment and reprocessing operations, adhere to the IAEA's Additional Protocol, which required more invasive inspections, and reveal all information regarding its nuclear program.

In return, the EU-3 promised that the matter would not be brought before the UNSC and promised to support Iran's civilian nuclear industry and other technological needs, provided Tehran complied with its obligations.[29] They further cautioned Tehran that any violation would lead to the matter being reported to the UNSC.

26. Dmitri Trenin and Alexey Malashenko, "Iran: A View From Moscow," Op. cit.
27. Charles D. Ferguson, "Steps Toward a Deal on Enhanced Safeguards for Iran's Nuclear Program," *Arms Control Today*, March 2011. http://www.armscontrol.org/act/2011_03/Ferguson
28. Oliver Thranert, "Ending Suspicious Nuclear Activities in Iran: Discussing the European Approach," Op. cit.
29. Robert J. Einhorn, "A Transatlantic Strategy on Iran's Nuclear Program," *The Washington Quarterly*, Autumn 2004, p. 22.

The United States has insisted since the beginning of the crisis that the IAEA Board of Governors was incapable of controlling and reversing Iran's nuclear program. As a result, the United States pushed for the issue to be brought before the UNSC. In situations where the Agency's mandates are not being followed, the UNSC serves as the final arbiter and guarantor in accordance with Article XII-C of the IAEA Statute. However, the EU-3 opposed the Bush Administration's recommendation, believing it lacked a clear strategy for how the UNSC should handle the situation. Nevertheless, the dispute over Iran's nuclear program ultimately came before the UNSC, which adopted several resolutions—1696, 1737, 1747, 1803, and 1929—sought to compel Iran to adhere to the IAEA's regulations.

The Security Council voted Resolution 1696 on July 31, 2006, calling on Iran to carry out the actions described in the resolution issued by the IAEA Board on February 4, 2006. These actions included resuming a thorough and ongoing halt of all enrichment-related and reprocessing activities as well as settling all outstanding concerns pertaining to Iran's nuclear program.[30] Iran was also warned by Resolution 1696 that sanctions might be imposed in the future. The first multilateral sanctions were subsequently imposed by UNSC Resolution 1737 (2006), which also demanded that Iran immediately cease all enrichment-related and reprocessing operations. This language, which emphasized the seriousness and necessity of compliance, was repeated in resolutions 1747 (2007), 1803 (2008), and 1929 (2010). The international community's attempts to curb Iran's nuclear aspirations grew steadily stronger as a result of these resolutions.

Three previous rounds of sanctions against Iran were strengthened and extended by UNSC Resolution 1929 (2010), which also added new requirements in a number of sectors. Pressure to halt uranium enrichment activities, including plans to enrich uranium up to 19.75% for medical research, stop construction of its facility in Qom, fully cooperate with the IAEA's investigation into the military aspects of its nuclear program, and allow the Agency unfettered access to all of its nuclear facilities were the main goals of this fourth round of sanctions. The resolution strengthened a number of military, high-tech, and economic penalties. In order to stop the

30. Dr. Mohamed ElBaradei, IAEA Director General, *Statement to the Sixty-First Regular Session of the United Nations General Assembly*, New York, October 30, 2006. http://www.iaea.org/newscenter/statements/2006/ebsp2006n020.html

acquisition of nuclear technology and experience, it prohibited Iran from funding sensitive nuclear projects outside, including uranium enrichment and reprocessing. Investments in uranium mining and activities involving ballistic missiles that could carry nuclear weapons were also prohibited. The resolution's prohibition on significant arms transfers to Iran was one of its most noteworthy features. All member states were required to "prevent the direct or indirect supply, sale, or transfer to Iran of any battle tanks, armored combat vehicles, large-caliber artillery systems, combat aircraft, attack helicopters, warships, missiles, or missile systems... or related material."[31]

Additionally, states were instructed to "prevent the provision to Iran of technical training, financial resources or services, advice, or other assistance related to the supply, sale, transfer, provision, manufacture, maintenance, or use of such arms and related material."[32] The purpose of these actions was to limit Iran's ability to advance its military and nuclear capabilities.

Joint Comprehensive Plan of Action (JCPOA)

The JCPOA, often known as the Iran nuclear deal, was signed on July 14, 2015, by Iran, the P5+1 nations (China, France, Russia, the United Kingdom, the United States, and Germany), and the European Union. The pact sought to prevent Iran from obtaining nuclear weapons and ensure that its nuclear program remained exclusively peaceful. UNSC Resolution 2231, which affirmed that Iran was not pursuing nuclear weapons and committed it to refraining from actions that would give the appearance that it did, approved the agreement.

The JCPOA provisions were designed to cap and roll back Iran's enrichment of uranium. For instance, the agreement capped Iran's uranium enrichment level, reduced its stockpile of enriched uranium, ensured transparency at the Fordow facility, and enhanced IAEA inspection and monitoring processes.[33] In return, Iran received significant sanctions relief. Under the deal, Tehran reduced its uranium enrichment capacity by decre-

31. United Nations Security Council, resolution S/RES/1929 (2010): https://main.un.org/securitycouncil/en/s/res/1929-%282010%29
32. Text of the United Nations Security Council Resolution 1929 (2010).
33. Robinson, "What Is the Iran Nuclear Deal?"

-asing the number of operational centrifuges and limiting enrichment levels to 3.67%. Additionally, Iran pledged to cut its enriched uranium stockpile by 98%, bringing it down to no more than 300 kg over a 15-year timeframe.[34]

The agreement effectively curtailed Iran's ability to produce weapons-grade uranium, which requires enrichment levels of 93%. Reports indicated that Iran dismantled two-thirds of its nearly 20,000 centrifuges, shut down its entire plutonium production facility, and relinquished approximately 97% of its low-enriched uranium stockpile, which previously totaled nearly eight tons. Additionally, the IAEA gained unprecedented powers to monitor Iran's nuclear facilities in perpetuity. The JCPOA offered a vital opportunity for the international community to promote the creation of a Middle East nuclear weapons-free zone. However, the potential of horizontal nuclear proliferation in the region has significantly increased as a result of the Trump administration's harsh stance and withdrawal from the deal.

Despite thorough monitoring and inspection reports from the IAEA that verified Iran was fulfilling its obligations under the JCPOA and the NPT, the Trump administration dismantled the JCPOA. These reports did not uncover any evidence of nuclear material being diverted for military purposes. However, Iran's apparent compliance was insufficient to change the mindset of President Donald Trump, a staunch critic of the JCPOA who frequently referred to it as a "bad deal." Trump was particularly concerned about Iran's growing regional influence and continued ballistic missile development.

Despite protests from the other signatories, the US unilaterally withdrew from the JCPOA on May 8, 2018, and reinstituted sanctions on Iran. The collapse of the JCPOA undermined the economic interests of the United Kingdom, France, Germany, and the EU,[35] while providing Russia and China with significant diplomatic, economic, and military advantages. Antony J. Blinken remarked, "The Trump administration's unilateral and

34. "Iran nuclear deal: What it all means," *BBC News Services*, November 23, 2021. https://www.bbc.com/news/world-middle-east-33521655

35. The Europeans desire to keep Iran's oil and gas products selling, continue sea, land, air, and rail transportation relations with Tehran, maintain effective banking transactions, and protect European investments in Iran.

misguided exit from the Iran nuclear deal freed Tehran's nuclear program from its confinement, undermining the security of the United States and its partners."[36] In an attempt to lessen the impact of US sanctions, Iran's then-foreign minister, Mohammad Javad Zarif, traveled to Beijing on May 13 and Moscow on May 14. Chinese Foreign Minister Wang Yi assured his Iranian counterpart, stating, "China will take an objective, fair, and responsible attitude, keep communication and cooperation with all parties concerned, and continue to work to maintain the deal."[37]

China may help the US and European nations in pressuring Iran to fulfill its responsibilities as a signatory to the NPT and to really cooperate with the IAEA, despite the fact that it has taken a balanced stance on Iran's uranium enrichment programs. "Given Iran's economic and strategic dependence on China, any US strategy to counter Tehran's nuclear and regional ambitions will likely require some collaboration with Beijing. There is reason to believe such cooperation is possible, despite the global competition between Beijing and Washington. China and the United States ultimately share common interests in the region i.e., political stability and the free flow of trade and energy."[38]

Iran and IAEA Polemic

Iran's nuclear program has steadily advanced since the US withdrawal from the JCPOA in 2018. Tehran has adopted a balanced nuclear approach, ensuring the continuation of nuclear research and development—particularly the high enrichment of uranium not required for civilian purposes—while maintaining its membership in the NPT. It gave the IAEA permission to inspect and monitor its nuclear plants in order to confirm adherence to the Treaty. However, the collapse of the JCPOA has intensified Iran's security dilemma, prompting Tehran to revisit its nuclear policy to deter perceived aggression and nuclear blackmail from Israel and

36. Antony J. Blinken, "Rebuilding Leadership for a New World," *Foreign Affairs*, Volume 103, Number 6, November-December 2024, p. 67.
37. Ben Westcott, Sara Mazloumsaki and Samantha Beech, "Iranian Foreign Minister visits Russia and China to try to save nuclear deal," *CNN World*, May 14, 2018. https://edition.cnn.com/2018/05/14/middleeast/zarif-russia-china-iran-deal-intl/index.html
38. "An estimated 90 percent of Iranian oil exports are bound for China," Karim Sadjadpour, "The New Battle for the Middle East Saudi Arabia and Iran's Clash of Visions," *Foreign Affairs*, Volume 103, Number 6, November-December 2024, p. 86.

and the US. Resultantly, Tehran has revised its uranium enrichment policy, attracting heightened scrutiny from the international community. After Tehran refused to comply with the IAEA Board's instructions, the debate over Iran's nuclear program grew more heated. Iran was officially censured by the IAEA on June 5, 2024, for its nuclear program developments and lack of cooperation.[39] Concerns regarding undeclared nuclear material and activities at four locations—Lavisan-Shian, Varamin, Marivan, and Turquz-Abad—were raised by the IAEA.[40]

As an NPT member state, Iran's nuclear activities are required to be under IAEA's safeguards. Iran should grant access and arrange for Agency inspectors to visit these sites to address and refute the IAEA's claims. On August 29, 2024, the IAEA reiterated, "The outstanding safeguards issues stem from Iran's obligations under its NPT Safeguards Agreement and need to be resolved for the Agency to be able to assure that Iran's nuclear [program] is entirely peaceful."[41]

In support of the IAEA's demands, France, Germany, and the UK urged Iran to refrain from producing nuclear weapons. However, Tehran rejected the IAEA's allegations. On September 6, 2024, Mohammad Eslami, the Head of the Atomic Energy Organization of Iran (AEOI), stated, "For over two decades, the nuclear case has been unjustly targeted against Iran. The arrogant system and the Zionists falsely claim a secret, undeclared nuclear program, utilizing this fabrication to pressure Iran's Atomic Energy Agency." He added, "The IAEA's responsibility is to investigate nuclear activity worldwide, but its arrangement is orchestrated by the arrogant system."[42] Eslami's rebuttal underscores Iran's position that it has not decided to develop a nuclear bomb.

39. IAEA Board of Governors, "NPT Safeguards Agreement with the Islamic Republic of Iran: Resolution adopted on June 5, 2024, during the 1723rd session," GOV/2024/39, June 5, 2024. https://www.iaea.org/sites/default/files/documents/gov2024-39.pdf.
40. David Albright and Andrea Stricker, "Analysis of the IAEA's Iran NPT Safeguards Report - August 2024," *Institute for Science and International Security*, September 5, 2024. https://isis-online.org/isis-reports/detail/analysis-of-the-iaeas-iran-npt-safeguards-report-august-2024
41. "NPT Safeguards Agreement with the Islamic Republic of Iran," Report by the Director General, IAEA- GOV/2024/44, August 29, 2024, p. 8. https://www.iaea.org/sites/default/files/documents/gov2024-44.pdf
42. "No deviation in Iran's nuclear program, nuclear chief says," *Tehran Times*, September 6, 2024. https://tehrantimes.com/news/503322/No-deviation-in-Iran-s-nuclear-program-nuclear-chief-says

Iran enriched 60% of its uranium stockpile, according to an August 2024 IAEA assessment.[43] This degree of enrichment contradicts Iran's declared stance that it has no plans to produce nuclear weapons and that its nuclear program is for civilian use. The concern arises because 60% enriched uranium can be quickly upgraded to 93%, which is suitable for the production of nuclear weapons. The US, Britain, France, and Germany remain committed to limiting Iran's enrichment operations. On November 21, 2024, the IAEA's Board of Governors voted 19 to 3 (with Russia, China, and Burkina Faso opposing and 12 abstentions) in favor of a resolution tabled by Britain, France, Germany, and the US.[44]

Antony J. Blinken commented, "Russia once supported UN Security Council efforts to constrain Iran's nuclear ambitions; now, it is enabling Iran's nuclear program and facilitating its destabilizing activities."[45] Iran was criticized by the IAEA for failing to fulfill its NPT-mandated cooperation with the Agency's monitoring and inspection activities. Iran's Atomic Energy Organization and foreign ministry responded by announcing intentions to start using new, more sophisticated centrifuges for uranium enrichment.[46]

The IAEA's censure could result in penalties against Iran, including renewed economic sanctions. However, Russia is expected to veto any attempt to impose sanctions on Iran through a UNSC resolution, given the growing defense cooperation between the two countries. Russia and Iran's strategic partnership has deepened since the beginning of the Ukraine war, driven by the Kremlin's need for Iranian weapons. "Iran is providing missiles and drones produced in its defense plants as well helping build such plants in Russia itself, and getting assistance with its own missile, drone,

43. David Albright, Sarah Burkhard, and Spencer Faragasso, "Analysis of IAEA Iran Verification and Monitoring Report — November 2024," *Institute for Science and International Security*, November 21, 2024. https://isis-online.org/isis-reports/detail/analysis-of-iaea-iran-verification-and-monitoring-report-november-2024

44. Steven Erlanger, "U.N. Watchdog Censures Iran Over Nuclear Program Secrecy," *New York Times,* November 21, 2024. https://www.nytimes.com/2024/11/21/world/europe/iaea-censure-iran-nuclear.html

45. Antony J. Blinken, "Rebuilding Leadership for a New World," *Foreign Affairs*, Volume 103, Number 6, November-December 2024, p. 73.

46. Steven Erlanger, "U.N. Watchdog Censures Iran Over Nuclear Program Secrecy," *New York Times*, November 21, 2024, https://www.nytimes.com/2024/11/21/world/europe/iaea-censure-iran-nuclear.html

and space programs and perhaps with civil nuclear power as well."[47] Consequently, As a vital geopolitical ally and source of weaponry, Iran has emerged as a key player in Moscow's war effort. In return, Moscow provided Tehran with diplomatic support, advanced air defense systems (such as the S-300), and other forms of assistance. For instance, Russia stated that Iran's nuclear program "does not pose any real problem"[48] for the international community. It has increased its diplomatic backing for Iran in international forums and facilitated its entry into organizations such as the Shanghai Cooperation Organisation (SCO) and BRICS.[49]

This partnership has come at the expense of Russia's relations with Israel. The United Nations has recognized Israel's right to self-defense, but Moscow has vehemently resisted this, calling it an "occupying state." Russia allegedly hosed a Yemeni team from Ansar Allah, also known as the Houthis, in January 2024 and provided satellite targeting information to support Houthi strikes on Western ships in the Red Sea. Furthermore, representatives of Hamas, and the Palestine Liberation Organization met in Moscow in February 2024 as part of an "intra-Palestinian" gathering that Russia had arranged.[50] Given these dynamics, Russia is unlikely to permit the US and European nations to reimpose UNSC sanctions on Iran.

Iran-Israel: tit-for-tat strikes

Washington has given Israel substantial financial and military backing as a key non-NATO partner of the US. For example, the Biden administration provided Tel Aviv with $17.9 billion in military aid between October 2023

47. Stephen Hadley, "Xi Jinping's Axis of Losers: The Right Way to Thwart the New Autocratic Convergence," *Foreign Affairs*, November 1, 2024. https://www.foreignaffairs.com/china/xi-jinpings-axis-losers

48. Erika Holmquist and Ismail Khan, 'Isolated together: Russian-Iranian Military Cooperation,' *FOI Memo* 8528, May 2024. https://www.foi.se/rest-api/report/FOI%20Memo%208528

49. Erika Holmquist and Ismail Khan, "Isolated together Russian-Iranian Military Cooperation," Russia and Eurasia Studies program, *FOI Memo* 8528, Project no: A12401, Swedish Defence Research Agency, Stockholm, May 2024. https://www.foi.se/rest-api/report/FOI%20Memo%208528

50. Eugene Rumer and Andrew S. Weiss, "Russia's Enduring Presence in the Middle East," Middle East—*Carnegie Endowment for International Peace*, November 1, 2024. https://carnegieendowment.org/research/2024/11/russias-middle-east-diplomacy-relationship?lang=en

and October 2024.[51] On July 27, 2024, a White House National Security Council spokesperson stated, "Our support for Israel's security is iron-clad and unwavering against all Iranian-backed terrorist groups, including Lebanese Hezbollah."[52] Israel and the US are also jointly involved in developing advanced military technology and weaponry. Israeli early warning systems, offensive and defensive missile systems, fighter jets, and other military assets have been manufactured with US technological and material support. This backing has given Israel a significant edge over Iran in military technologies, including satellite monitoring systems, due to the generous financial, technological, and material assistance provided by the US. This superiority in military technology, coupled with its strong partnership with the US, has emboldened Israel to systematically broaden the scope of the Gaza War, aiming to undermine Iran's influence in the Middle Eastern region.

Israel has been making a concerted effort to draw Iran in its war on Palestine since it began in October 2023. Prime Minister Benjamin Netanyahu appears convinced that Iran's engagement in the war would serve as a trigger for US military involvement, which could potentially obliterate Tehran's growing influence in the Middle Eastern region and destroy its ballistic missile as well as latent nuclear capabilities. Such an outcome would eliminate the "Axis of Resistance" and establish Israel's undisputed hegemony in the region.

Thirteen people, including seven top members of Iran's Islamic Revolutionary Guard Corps (IRGC), were killed in an Israeli attack on the Iranian consulate in Damascus, Syria, on April 1, 2024. This attack escalated tensions, leading to tit-for-tat strikes between Iran and Israel. On April 13, 2024,[53] Iran retaliated by launching Operation True Promise (OTP-1), a massive aerial assault involving 300 missiles and drones targeting Israel.[54]

51. Knickmeyer, Ellen "US Spent a Record $17.9 Billion on Military Aid to Israel Since Last October 7," *Time Magazine,* October 7, 2024.
52. "US condemns 'horrific' missile attack on Druze village in Israel," *Reuters*, July 28, 2024. https://www.reuters.com/world/us-condemns-horrific-missile-attack-druze-village-israel-2024-07-27/.
53. Kelsey Davenport, "Iran-Israel Tensions May Push Iran to Rethink Nuclear Arms," *Arms Control Today,* May 2024. https://www.armscontrol.org/act/2024-05/news/iran-israel-tensions-may-push-iran-rethink-nuclear-arms
54. "Iran-Israel Tensions May Push Iran to Rethink Nuclear Arms."

Israel responded six days later, on April 19, 2024, by attacking many Iranian military locations, notably those close to Isfahan, a city known to have declared nuclear facilities.[55] Fears of a possible Israeli attack on Iran's nuclear facilities were heightened by the increasing number of strikes and calls from former US and Israeli officials for Prime Minister Netanyahu to target these locations. On April 14, 2024, former US National Security Advisor John Bolton publicly advocated for Israel to "destroy Iran's nuclear weapons program."[56]

The killings of Hezbollah commander Fuad Shukur in Beirut on July 29, 2024, and Hamas leader Ismail Haniyeh in Tehran on July 30, 2024, exacerbated the situation even more. These actions elicited strong responses from Iranian leadership, which vowed to retaliate. The killing of Haniyeh in Tehran seemed to be a calculated effort to provoke Iran into a larger conflict. Iran, which has consistently opposed American and Israeli influence in the region, regarded the attack as a direct provocation.

Iran began Operation True Promise-2 (OTP-2) on October 1, 2024, launching a relentless assault of 180–200 missiles against Nevatim Airbase, Tel Nof Airbase, the Mossad headquarters in Tel Aviv, and other locations in and near Tel Aviv.[57] Tehran claimed that it had achieved its objectives by damaging the physical infrastructure of the Mossad headquarters, Nevatim Airbase, and Hatzerim Airbase. Recognizing the rapidly escalating violence in the region, UN Secretary-General António Guterres addressed an emergency meeting of the UNSC, declaring: "This deadly cycle of tit-for-tat violence must stop."[58]However, Israel reacted negatively, declaring Guterres "persona non grata." Israeli Foreign Minister Katz remarked, "Anyone who cannot unequivocally condemn Iran's heinous attack on Israel does not deserve to step foot on Israeli soil."[59]

55. "Iran-Israel Tensions May Push Iran."
56. "Iran-Israel Tensions"
57. David Gritten, "Iran launches more than 180 ballistic missiles at Israel," BBC News, October 2, 2024. https://www.bbc.com/news/articles/c9dyxxgxv1jo; "Iran missiles target 'Mossad HQ, air base housing F-35 jets'; Israel to hit oil facilities," *Hindustan Times*, October 2, 2024.
58. "'Deadly Cycle of Tit-for-Tat Violence Must Stop,' Demands Secretary-General, as Security Council Takes Up Situation in Middle East," *United Nations Meetings Coverage and Press Releases*, October 2, 2024. https://press.un.org/en/2024/sc15841.doc.htm.
59. "Israel declares UN chief persona non grata," *Dawn*, October 3, 2024. https://www.dawn.com/news/1862753, accessed on October 3, 2024.

OTP-2 demonstrated greater military sophistication compared to OTP-1, employing slow-moving drones and cruise missiles, which gave Israel more warning time. During this operation, Iran used advanced missile systems, including Emad and Ghadr-1 medium-range ballistic missiles (variants of the Shahab-3), as well as the Fattah-1, which Iran described as a "hypersonic missile." Jeffrey Lewis, a noted American scholar, tweeted, @ArmsControlWonk, "Our first count is that 32 missiles struck Nevatim Air Base."

Despite Israel's state-of-the-art military hardware, it faces challenges in intercepting long-range ballistic missiles, particularly hypersonic missiles. The Iron Dome is reliable against rockets and drones, while David's Sling is effective against short-range missiles with ranges between 100 and 200 kilometers. Similarly, the Arrow missile defense systems, comprising Arrow-2 and Arrow-3, are designed to intercept missiles up to 1,500 miles away and at altitudes of 100 miles but are not optimized to counter hypersonic ballistic missiles. Israel's key advantage lies in its close coordination with the US military, which provides crucial assistance during crises. During OTP-2, US Navy destroyers Bulkeley and Cole, deployed in the Middle East, fired approximately a dozen interceptors to defend against incoming Iranian missiles.[60]

A critical examination of OTP-2 revealed that Tehran deliberately avoided targeting residential areas to minimize civilian casualties. Thus, the operation aimed to demonstrate Iran's military capability to inflict unacceptable damage on Israel while attempting to establish a stable deterrence between Tehran and Tel Aviv. This tactic sought to deter Israel and its allies from conducting covert intelligence and overt military operations against Iran. Additionally, OTP-2 was an effort to restore Tehran's credibility in the Middle East, exposing Israel's vulnerability to Iran's military capabilities. Simultaneously, the missile strikes provided Israeli Prime Minister, Netanyahu an opportunity to broaden the war theater and create conditions for involuntary US involvement in a potential all-out war between Iran and Israel.

60. Heather Mongilio, "US Warships Fire a Dozen Interceptors Against Iranian Missile Attack," *US Naval Institute*, October 1, 2024. https://news.usni.org/2024/10/01/u-s-warships-fire-a-dozen-interceptions-against-iranian-missile-attack-against-israel.

Without American participation, Israel is unlikely to effectively terminate Iran's influence in Middle Eastern geopolitics or neutralize its missile inventories and latent nuclear weapons potential. Despite OTP-2 exposing Israel's vulnerabilities, Tel Aviv remained resolute, declaring that Iran would "pay a price" for its actions.[61] In response to OTP-2, Israel launched a targeted attack on an Iranian missile production site on October 26, 2024, killing one civilian and four IRGC soldiers. Following this escalation, the US deployed B-52 Stratofortress bombers and F-15 fighter jets to the region. "The US military became an active participant in the war—twice stepping in to defend Israel against Iranian missile and drone attacks following Israeli escalations."[62]

The Nuclear Threat

OTP-2 demonstrated Iran's advanced missile capabilities. Despite close coordination between Israeli and American forces and attempts by US naval destroyers to shield Tel Aviv, Iranian missiles breached defenses and struck their intended targets on October 1, 2024. Missile interceptors were unable to intercept the Fattah-2, a hypersonic glide vehicle capable of speeds between Mach 5 and 20. However, conventional warfighting capabilities alone are insufficient to deter nuclear blackmail or aggression.

Israel, possessing nuclear weapons capability, has openly signaled its willingness to use them for its defense. Prime Minister Benjamin Netanyahu delivered a stern warning to Iran during his speech at the United Nations General Assembly (UNGA) on September 22, 2023, stating, "Above all—Iran must face a credible nuclear threat. As long as I'm prime minister of Israel, I will do everything in my power to prevent Iran from getting nuclear weapons."[63]

61. Israel vows Iran "will pay a price" for drone attack on PM Netanyahu's home," *Asian News Network,* October 21, 2024. https://asianews.network/israel-vows-iran-will-pay-a-price-for-drone-attack-on-pm-netanyahus-home/.
62. Kelly A. Grieco, "Bring the National Defense Strategy into Balance," *Defense Policy & Posture, Stimson Center*, November 20, 2024. https://www.stimson.org/2024/bring-the-national-defense-strategy-into-balance/?utm_source=Stimson+Center&utm_campaign=a60efcdfa9-RA%2FComms%2FWeekendRead+Pres.+Inbox+%231&utm_medium=email&utm_term=0_-a60efcdfa9-46283745.
63. "Prime Minister Netanyahu's 2023 UN General Assembly Speech," *Jewish Virtual Library*, September 22, 2023. https://www.jewishvirtuallibrary.org/prime-minister-netanyahu-s-2023-un-general-assembly-speech.

On November 5, 2023, Israeli Heritage Minister Amichai Eliyahu threatened to use "some kind of atomic bomb" on the Gaza Strip "to kill everyone."[64] He renewed this call on January 24, 2024, advocating for a nuclear strike on Gaza."[65] These statements serve a deliberate purpose: to advertise Israel's nuclear weapons capability and reinforce the notion that Israel could employ these weapons in a war for its defense.

The rhetoric from Israel's ruling elite regarding the potential use of nuclear weapons in the ongoing Middle Eastern crisis warrants critical examination. Despite conducting an atmospheric nuclear test off the South African coast in 1979, Tel Aviv has traditionally maintained a firm and opaque nuclear policy. The apparent shift in this policy raises two interlinked questions: why has there been a shift in Israel's nuclear policy, and what are the ramifications of this change? It appears that this shift is driven by the unpredictable dynamics of asymmetrical warfare. The Israeli ruling elite seems to have concluded that it cannot decisively win in an asymmetrical conflict. Consequently, Israel has sought to create a new theater of confrontation and leverage the massive support of its US-led Western allies as a means of face-saving and ensuring survival in an increasingly hostile regional environment.

The primary aim of the Israeli ruling elite's references to the use of nuclear weapons is to intimidate and coerce Iran while terrorizing the entire region with the threat of nuclear retaliation. This repeated rhetoric reinforces the notion of Tel Aviv's "Samson Option," which refers to Israel's doomsday strategy of employing nuclear weapons to annihilate the region if the state of Israel faces existential collapse. The Samson Option is considered a last resort, to be employed in the event of conventional deterrence failure. In essence, Israel possesses nuclear capability and has signaled its willingness to use it if deemed necessary. During the first week of October 2024, speculation about Iran's nuclear program focused on whether Iran had clandestinely conducted a nuclear test. However, no credible information confirmed such an event.

64. "Israel minister reprimanded over Gaza nuclear 'option' comment," *Le Monde with AFP*, November 5, 2023. https://www.lemonde.fr/en/international/article/2023/11/05/israel-minister-reprimanded-over-gaza-nuclear-option-comment_6229042_4.html.
65. "Israeli minister renews call for striking Gaza with 'nuclear bomb," *AA*, January 24, 2024. https://www.aa.com.tr/en/middle-east/israeli-minister-renews-call-for-striking-gaza-with-nuclear-bomb-/3117351.

The US' withdrawal from the JCPOA in 2018 enabled Iran to expand its uranium enrichment stockpile and increase purity levels to 60%. Furthermore, Iran has achieved notable progress in its ballistic missile program. According to media reports, Iran has accumulated sufficient near-weapons-grade uranium to potentially produce approximately three nuclear weapons. Iran could develop enough weapons-grade material for a nuclear weapon in less than a week, according to security analysts.[66] Ahmad Haghtalab, the commander of the IRGC in charge of protecting Iran's nuclear facilities remarked that the potential for Israeli strikes on Tehran's nuclear infrastructure "makes it possible to review our nuclear doctrine and deviate from our previous considerations."[67]

The Iranian leadership has warned that any attack by Israel on its nuclear infrastructure would be counterproductive. Analysts generally agree that a strike by the US or Israel would not eliminate Iran's nuclear capability but instead push Iran from being a latent nuclear-capable state to an overt nuclear-armed state. Regarding the speculation of a clandestine nuclear test, Tehran has maintained silence. To date, Iran has neither withdrawn from the NPT nor officially announced a shift in its nuclear policy. Iran has not conducted a nuclear test, but it can be concluded that it has acquired rudimentary fissile material and modernized nuclear-capable delivery systems.

A shift in Iran's nuclear strategy could set off a chain reaction across the Middle East and North Africa (MENA) region, destabilizing the existing nuclear world order. Regional non-nuclear states, including Egypt, Saudi Arabia and Turkey, might increasingly pursue nuclear weapons development, driven by their perceived deterrent value. Saudi Arabia, in particular, has long stated that it would develop nuclear weapons if Iran obtained them. Presently, Riyadh is planning to construct a nuclear power plant under IAEA safeguards and has sought a civilian nuclear agreement with the US. However, critics argue that Saudi Arabia's advancements in nuclear energy could enable it to initiate a nuclear weapons program.

66. David Albright, "Home How quickly could Iran make nuclear weapons today?" *Institute for Science and International Security*, January 8, 2024. https://isis-online.org/isis-reports/detail/how-quickly-could-iran-make-nuclear-weapons-today.
67. "Iranian commander says Tehran could review 'nuclear doctrine' amid Israeli threats," *Reuters*, April 18, 2024. https://www.reuters.com/world/middle-east/iranian-commander-warns-tehran-could-review-its-nuclear-doctrine-amid-israeli-2024-04-18/.

Consequently, Washington has been reluctant to finalize a civilian nuclear agreement with Riyadh. This cautious American approach may prompt Saudi Arabia to seek nuclear technology and material assistance from Russia and China, both of which have made nuclear industry exports a cornerstone of their energy and geopolitical strategies. Moreover, several nations in the MENA region, including Egypt, Saudi Arabia, Qatar, and the United Arab Emirates, are advancing plans to develop nuclear power plants. These countries rely on civilian nuclear cooperation, which entails the transfer of nuclear technology, materials, or expertise from NSG members for peaceful purposes.

However, Iran's deviation from its commitments under the IAEA and its obligations as a signatory to the NPT undermines the trust of nuclear supplier states. This erosion of confidence discourages them from supporting civilian nuclear aspirants in the region, fearing these nations might emulate Iran's precedent and potentially divert civilian nuclear programs toward military applications.

Conclusion

Iran continues to focus on advancing its nuclear and missile capabilities, utilizing indigenous technology and expertise acquired from Russia. For the IAEA, dealing with Tehran has become significantly more challenging. Iran now possesses a larger uranium enrichment stockpile, more advanced and diversified missile programs, and strategic partnerships with China and Russia, all of which have emboldened its position. When the time is right, Iran is likely to demonstrate a willingness to cap uranium enrichment to strengthen its negotiating position with a potential Trump Administration 2.0.

Tehran could also exploit Trump's hawkish stance on China to draw Beijing closer, thereby fortifying a united Iran-China-North Korea-Russia front to challenge the US. If Trump's "America First" approach weakens US alliances, Tehran may seize the opportunity to establish cooperation with European nations, shaping the regional and international environment to its advantage. In summary, the preceding discussion reveals that Iran has achieved latent nuclear weapons potential. The IAEA, with the support of the US and European nations, has failed to cap and roll back Iran's uranium

enrichment efforts. Israel has undertaken covert operations to hinder Iran's nuclear program modernization but has been unable to inflict significant damage on Iran's nuclear facilities, many of which operate under IAEA safeguards. Furthermore, Israel's missile and air forces cannot destroy Iran's deeply buried nuclear facilities without US assistance. The US shares Israel's interest in eliminating Iran's nuclear potential and curbing its influence in Middle Eastern geopolitics.

However, the rapid transformations in international politics are exposing the limits of US power and highlighting Russia's growing assertiveness in Middle Eastern affairs. Consequently, escalating skirmishes between Iran and Israel, along with the direct involvement of the US in regional warfare, could compel Iran to exit the NPT, conduct a nuclear weapons test, and further entangle great powers in a regional conflict, potentially causing more significant global challenges.

2

Indo-French Strategic Symbiosis: Implications for Strategic Stability in South Asia

Indo-French Strategic Symbiosis: Implications for Strategic Stability in South Asia

Sufian Ullah[*]

Abstract

How does the Indo-French strategic alliance manifest, and what are its implications for the regional strategic stability of South Asia? This paper examines the above critical question by analyzing the alignment of France and India in advancing their respective strategic interests within the contemporary geopolitical landscape. Beyond economic and commercial synergies, the partnership is strategically oriented toward countering China's growing influence in Asia-Pacific. This paper identifies and evaluates the primary factors driving the Indo-French strategic alignment, tracing its historical evolution and examining its manifestations in enhanced cooperation in nuclear technology, advanced defense capabilities, and military modernization. These developments are analyzed in the context of South Asia's strategic stability, emphasizing how the deepening partnership supports India's assertive strategic posture and military ambitions, thereby exacerbating the region's security dilemmas. Furthermore, the paper critically assesses the implications of joint efforts in developing nuclear-capable platforms, such as the Rafale fighter aircraft, and how these efforts challenge the principles of the nuclear non-proliferation regime. Through this analysis, the article highlights the broader ramifications of the Indo-French partnership for the regional security dynamics of South Asia.

Keywords: South Asia, Strategic Stability, Indo-Pacific, Geopolitics, Nuclear Non-proliferation.

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Introduction

In an increasingly multipolar international security environment, the evolving Indo-French strategic alliance raises critical questions about its potential to redefine regional stability in South Asia and its influence on global nuclear governance frameworks. Recent years have witnessed a significant strengthening of Indo-French relations, marked by deepening strategic cooperation and alignment of geopolitical aspirations. During French President Emmanuel Macron's visit to New Delhi in January 2024, the two states signed pivotal agreements for joint military production, including conventional Scorpene submarines for the Indian Navy and H125 helicopters through industrial partnerships.[1]

The leadership of the two states reaffirmed their commitment to bolster their existing strategic partnership and expand its scope. This paper builds an understanding of key strategic convergences and drivers of the Indo-French alliance system. The paper further examines how Indo-French collaboration may reshape regional security dynamics and influence global nuclear governance mechanisms. To achieve this, the analysis is organized into three sections: the first section explores the primary factors driving India and France closer together while the second section examines the key aspects of their defense cooperation. The last part of this paper assesses the broader implications of this partnership for regional security and its impact on international nuclear norms.

Key Convergences and Drivers of Indo-French Strategic Partnership

India has developed extensive strategic relationships with several major powers to address the growing demands of its defense and security sectors. To solidify its role as a net security provider in the Asia-Pacific region to the West, Premier Narendra Modi's government has actively pursued defense cooperation with numerous regional and extra-regional powers through effective military diplomacy. In the twenty-first century, India has gradually reduced its reliance on Russian weaponry, with arms imports from Russia now accounting for less than half of New Delhi's total arms imports in rece-

1. Manoj Kumar, "India, France agrees on Joint Defence Production," *Reuters*, 27 January 2024. https://www.reuters.com/world/india-france-agree-joint-defence-production-statement-2024-01-27/.

-nt years.[2] Given the US efforts to dissuade India from relying on Russia-supplied defense equipment,[3] New Delhi's strategic collaborations with Western states have already witnessed significant growth. Over the past two decades, India has cautiously engaged with the US and France to acquire advanced and sophisticated weapons-related technologies, thereby reducing its reliance on Moscow.

Against this backdrop, India and France forged a renewed strategic partnership in 1998.[4] Since then, France has emerged as India's most trusted and least controversial strategic partner. The Ministry of External Affairs in New Delhi highlights that this strategic partnership has expanded to include multiple sectors, such as security, space, defense, and civil nuclear cooperation.[5] A shared convergence of interests has drawn Paris and New Delhi closer. This strategic partnership is characterized by a confluence of three common and interconnected elements, including a shared, though not identical, vision for the broader Asia-Pacific (now Indo-Pacific) region. This entails several strands: first, the containment of China's growing influence within Asia and beyond; second, advocating for adjustments of the contemporary international order—as per the evolving circumstances thereby accommodating geopolitical aspirations of both states;[6] and third, pursuing a strategic relationship centered on arms transfers and civil nuclear cooperation, primarily driven by shared commercial interests. The converging characteristics of this bilateral relationship are outlined and discussed below.

The Indo-Pacific Concept: French and Indian Perspectives

The US has introduced the "Indo-Pacific concept," while divorcing from the Asia-Pacific framework to counter China's growing influence by uplift-

2. K. Alan Krontadt, "India-Russia Relations and Implications for U.S. Interests," *Congressional Research Service*, 24 August 2022. https://crsreports.congress.gov/product/pdf/R/R47221/3.
3. K. Alan Krontadt and Shayerah I. Akhtar, "India-U.S. Relations: Issues for Congress," *Congressional Research Service*, 16 June 2023. https://sgp.fas.org/crs/row/R47597.pdf.
4. "India – France Relations,"*Ministry of External Affairs, Government of India*, January 2016. http://www.mea.gov.in/portal/foreignrelation/france_jan_2016.pdf
5. "India France Relations," *Ministry of External Affairs*, August 2013. https://www.mea.gov.in/Portal/ForeignRelation/India-France_Relations.pdf
6. Mariya Gringberg, "Flexibility in Order: Three Conditions that Preclude Change in International Order," *Notre Dame International Security Center*, 13 March 2021. https://ndisc.nd.edu/assets/423360/grinberg_ndisc_seminar_12.03.21.pdf.

-ing India's stature as a key partner in this region. India and France both endorse the "Indo-Pacific" concept, while holding distinct perspectives on the "Indo-Pacific," rooted not in geographical considerations but in the strategic interpretation and construction of this concept. The "Indo-Pacific" is a "geographical translation of a strategic concept" designed to provide a shared framework for shaping and defining policies.[7]

India and France share a unique foundation in their bilateral relations with two states i.e., the US and China, leading to distinct approaches to the "Indo-Pacific" concept and divergent responses to China's peaceful rise. France defines the "Indo-Pacific" region geographically as extending from "Djibouti to French Polynesia and the shores of East and Southern Africa to the American coasts.[8] France views itself as a significant player and a resident power in the "Indo-Pacific" region. France holds over 2 million square kilometers of territory in the Indian Ocean Region (IOR), which includes a dozen islands, each surrounded by 200 nautical miles of Exclusive Economic Zones (EEZ). This accounts for nine out of eleven million square kilometers—approximately 93% of France's total EEZ located in the Indo-Pacific.[9]

France also regards itself as the guardian of the strategic maritime route between the Cape of Good Hope and the Gulf countries. While France is widely acknowledged as a significant European power, it views itself as a key stakeholder in the IOR, primarily due to its perceived littoral presence and economic interests in the area.[10] France has two significant islands in the IOR, Réunion Island and Mayotte, which host a dedicated force of 2,000 French troops. Additionally, two patrol boats and French frigates are stationed on Réunion Island.[12]

7. Fraderic Grare, "Exploring Indo-Pacific Convergences: The Australia-France-India Trilateral Dialogue," *The Washington Quarterly* 43, no. 4 (2020): 157.
8. Grare, "Exploring Indo-Pacific Convergences," 159.
9. Ministry of the Armed Forces, "France's defence strategy in the Indo-Pacific. Paris: Ministère des Armées," 2019. https://dkiapcss.edu/wp-content/uploads/2020/02/France-Defence_Strategy_in_the_Indo-Pacific_2019.pdf
10. David Brewster, "The Mozambique Channel is the next security hotspot," *The Interpreter*, 19 March 2021. https://www.lowyinstitute.org/the-interpreter/mozambique-channel-next-security-hotspot.
11. Alistair Cole and Jean-Pierre Cabestan, "The Ties That Bind: Protection and Projection in France's Indian Ocean Islands of Mayotte and Réunion," *Geopolitics* (2024): 15.

Control over these islands is crucial for France to uphold its "Indo-Pacific" strategy and advance other strategic interests, including military protection, addressing security concerns, and safeguarding economic priorities.[12] French military bases in Djibouti and the United Arab Emirates (UAE) further enhance its presence and strengthen its capacity to exert influence in the IOR.[13]

India in parallel professed its "Indo-Pacific" doctrine in 2018 through Premier Modi's address at the Shangri-La Dialogue in June, where he emphasized the importance of preventing the resurgence of geopolitical rivalries in the region. New Delhi's vision of the "Indo-Pacific" is frequently regarded as an extension of its Act East Policy.[14] Although New Delhi asserts a policy of non-alignment in the ongoing geopolitical rivalry, its closer strategic collaboration with Washington is primarily driven by its geopolitical priorities in the region. Nonetheless, despite its confrontation with Beijing, New Delhi cautiously maintains a degree of cooperation with China.

France's presence in the region has traditionally remained uncontested. To further enhance its presence, India emerges as the most logical partner to assist France in achieving its strategic objectives. In recent years, there has been a significant increase in maritime security collaboration between India and France.[15] The evolving geostrategic environment in the region acts as a catalyst, bringing India and France closer. The gradual decline of American hegemony globally, China's expanding influence in Europe, Africa, and the Mediterranean, along with the strengthening ties between China and Russia, are key factors prompting India and France to view each other as vital partners in diversifying their strategic alliances.

France's Defense Strategy in the Asia-Pacific region primarily focuses on countering China's anticipated expansion of its military footprint in the bl-

12. Cole and Cabestan, "The Ties That Bind," 2.
13. Isabelle Saint-Mézard, "The French Strategy in the Indian Ocean and the Potential for Indo-French Cooperation," *RSIS*, March 2015. https://www.files.ethz.ch/isn/189458/PR150312_French-Strategy.pdf
14. Allan Gyngell, "To Each Their Own Indo-Pacific," *Australian Outlook (Australian Institute of International Affairs)*, May 29, 2018. http://www.internationalaffairs.org.au/australianoutlook/to-each-their-own-indo-pacific/.
15. Shreya Sinha, "India's Military Modernization: Role and Impact of France," *Journal of Asian Security and International Affairs*, vol 10, no. 3 (2023): 325-341.

-ue waters of the Indian Ocean in the coming years.[16] The US-led alliance system has identified India as a key balancer and stabilizer to counter China in the broader Asia-Pacific region. French President François Hollande once remarked, "India reassures, whereas China is scaring."[17] Similarly, while discussing the Indo-French defense relationship, French Minister of Defense Jean-Yves Le Drian stated in July 2013, "In the South Asian region, India appears to us as a factor of stability."[18] This confluence of interests drives both states toward closer bilateral cooperation.

France's "Indo-Pacific" strategy emphasizes that, in light of the ongoing strategic competition between China and the US, France remains steadfast in its commitment to promoting a multilateral international order in collaboration with partners like India.[19] France's pivot to the "Indo-Pacific" and its aspiration to shape regional norms are directly influenced by China's expanding presence in the region.[20] As a self-proclaimed resident power in the region, France carefully navigates its relationships amidst the shifting regional balance of power. Experts suggest that France should leverage the development of the trilateral security partnership between Australia, the United Kingdom, and the United States, commonly known as AUKUS, as an opportunity to explore deeper cooperation with other Asian and non-aligned states.[21]

By leveraging its assets, including geographic resources, consistent military deployments, and strong relations with local powers, France can position itself as a balancing power in the region rather than becoming entangled in the competition between the US and China.[22]

16. "France's defence strategy in the Indo-Pacific,": 9.
17. Yves-Marie Rault, "France & India: Decoding the Strategic Partnership," *Institute of Peace and Conflict Studies,* November 2013. https://www.files.ethz.ch/isn/175040/SR147-Yves-IndiaFrance.pdf
18. Rault, "France & India: Decoding the Strategic Partnership."
19. "France's Indo-Pacific Strategy," *Government of France*, https://ambafrance.org/IMG/pdf/en_indopacifique_web.pdf
20. Mahima Duggal, "The China Factor in France's Indo-Pacific Strategy," *Journal of Indo-Pacific Affairs,* Vol 5, No. 4 (2022): 5.
21. Eric Frecon, "France's Third Path for the Indo-Pacific? Credentials and Challenges," *ISEAS Perspective,* Vol 12 (2022): 2.
22. Jérémy Bachelier and Céline Pajon, "France in the Indo-Pacific: The Need for a Pragmatic Strategic Posture," *Focus Strategique*, 2023. https://www.ifri.org/sites/default/files/atoms/files/ifri_bachelier-pajon_france_in_the_indo-pacific_oct2023.pdf

Aspirations to Amend the International Order –A Shared World View

The liberal international order experienced the unchallenged primacy of the US following the disintegration of the Soviet Union in 1991. In recent years, the structure of the international order underwent increased scrutiny as rising dissatisfied powers i.e., China and Russia seem to have challenged the US' sole ability to maintain and preserve the existing order. The US National Security Strategy (NSS) of 2022 identifies China and Russia as states pursuing revisionist foreign policies.[23] There is a growing consensus that the international order is rapidly transitioning towards multipolarity. Although several states, including China, India, and France, emphasize the importance of embracing and upholding multipolarity, there is a noticeable divergence in their perspectives regarding the structure and composition of this emerging multipolar world order.

While some states, particularly close allies of the US, advocate for an international system dominated by a single superpower with power distributed among a few major powers,[24] while others call for greater representation of emerging powers in global decision-making processes.[25] This indicates that while some states pursue revisionism, they aim to seek amendments to the international order rather than its complete overhaul or destruction. France and India are among the states that increasingly align with Western powers in the ongoing geopolitical rivalry and advocate for selective revision of certain components of the existing international order.

Observers note that India, despite its growing alignment with the US and other Western states following the demise of the Soviet Union, maintains a revisionist orientation at the global level.[26] Without directly challenging the US-led liberal political order, New Delhi pursues a form of revisionism aim-

23. "National Security Strategy," *The White House Washington*, https://www.whitehouse.gov/wp-content/uploads/2022/10/Biden-Harris-Administrations-National-Security-Strategy-10.2022.pdf
24. "Great Power Competition: Implications for Defense – Issues for Congress," *Congressional Research Services* (2024): 42, https://sgp.fas.org/crs/natsec/R43838.pdf; "Wang Yi Elaborates on an Equal and Orderly Multipolar World and a Universally Beneficial and Inclusive Economic Globalization," *Ministry of Foreign Affairs of the People's Republic of China*, 07 March 2024.
25. Indian Prime Minister Narendra Modi's address to United National General Assembly on 26 September 2020, cited in "Indian and United Nations," *Permanent Mission of India to the United Nations New York*, https://www.mea.gov.in/Images/amb/India_United_Nations_new1022.pdf
26. Takenori Horimoto, "Explaining India's Foreign Policy: From Dream to Realization of Major Power," *International Relations of the Asia-Pacific* 17, no. 1 (2017): 475.

-ed at modifying specific aspects of the global order to establish itself as a prominent actor in the evolving international system. One notable example is its advocacy for revising the composition of the United Nations Security Council (UNSC) to secure permanent membership. This aspiration is reinforced by India's ongoing efforts to establish hegemony in its immediate neighborhood and to expand its political and military influence in the Asia-Pacific region.[27] In this way, the Modi government aims for India to emerge as a proactive and influential player on the international stage, rather than a reactive one.[28]

France, in contrast, has remained politically aligned with the Western camp since the onset of the Cold War. Despite its long history as a unique and dominant European great power, France has consistently played the role of a guardian of the liberal international order alongside other Western powers. Nevertheless, successive leaderships in Paris have cautiously pursued the ambition of restoring France's lost glory in the post-war era.[29] This strategy has largely revolved around leveraging France's participation and influential role in key international institutions such as the UNSC. Taking on the responsibility of promoting shared global objectives, France has strongly advocated multipolarity to preserve its great power status instead of promoting the sole leadership of any single state, including the US.[30] French leadership has often been critical of US policy approaches on the global stage, particularly regarding issues such as the invasion of Iraq, socio-economic disparities between the Global North and South, and the use of veto power by permanent members of the UNSC, especially in matters involving war crimes.[31]

27. Sufian Ullah, "Realignments and evolving nuclear capabilities in the Indian Ocean: effects on security environment," *Australian Journal of Maritime and Ocean Affairs*, Vol 13, No. 4 (2021): 262-273.
28. Harsh V. Pant, "Introduction," in *The Rise of the Indian Navy*: *Internal Vulnerabilities, External Challenges,* ed., Harsh V. Pant (New York: Routledge, 2016): 6.
29. Pernille Rieker, "French Status Seeking in a Changing World: Taking on the Role as the Guardian of the Liberal Order," *Fr Polit* 16 (2018): 421.
30. Alexei Chikhachev, "Saving the Hegemony: French Perspective on the Changing World Order," *Russian International Affairs Council*, 18 September 2023. https://russiancouncil.ru/en/analytics-and-comments/analytics/saving-the-hegemony-french-perspective-on-the-changing-world-order/.
31. "Why France wishes to regulate use of the veto in the United Nations Security Council," *Ministere De L'Europe Et Des Affaires Etrangeres.* https://www.diplomatie.gouv.fr/en/french-foreign-policy/france-and-the-united-nations/france-and-the-united-nations/france-and-the-united-nations-security-council/why-france-wishes-to-regulate-use-of-the-veto-in-the-united-nations-security-65315/,; Elisabetta Martini, "UN Security Council Reform: Current Developments," *Instituto Affiari Internazionali*. https://www.iai.it/sites/default/files/iai0926.pdf

France actively supports India's bid for a permanent seat on the UNSC.[32] Additionally, during the first presidency of Donald Trump, President Macron took a critical stance against the Trump administration's hardcore unilateral policies. The Paris Peace Forum is seen by some experts as an effort to replicate aspects of the UN.[33] Therefore, while Paris aims to preserve the Western-led contemporary world order, it also aspires to introduce adjustments to the international system that counter US hegemony and advocate for a more balanced distribution of power.

French President Emmanuel Macron appears to aspire to a leadership role within the European Union (EU) following Brexit. In light of President Trump's retreat from commitments to North Atlantic Treaty Organization (NATO) members, Macron urged EU member states to develop a coordinated defense strategy, with France positioned to play a central role.[34] To project a more assertive European posture under French leadership, Paris may leverage its military capabilities to expand its presence in the Asia-Pacific region and deepen strategic cooperation with India.[35] The US is unlikely to oppose such partnerships, particularly those that do not overtly pursue revisionism, actively resist China's expanding geopolitical and military influence, and contribute to sharing the burden of maintaining a stable regional and global order.

Therefore, while committed to the shared goal of preserving the liberal international order, both India and France share a common objective of pursuing selective revisions to the existing international system.[36] In the post-Cold War era, India effectively leveraged its shared vision with France for a multipolar international system to secure strategic benefits. Rakesh Sood, India's former Ambassador to France, highlights that French leadership has

32. Nadia Sarwar, "Expansion of the United Nations security Council," *Strategic Studies* 31, no. 3 (2011):272.
33. Chikhachev, "Saving the Hegemony."
34. Julie Gaubert, "Macron calls for coordinated EU nuclear defence strategy – with France at Centre," *Euro News*, 02 February 2020. https://www.euronews.com/2020/02/08/macron-calls-for-coordinated-eu-nuclear-defence-strategy-with-france-at-centre
35. "France in the Indo-Pacific: Proactive Power and Solutions Provider," *The Foundation for Strategic Research*, https://www.frstrategie.org/sites/default/files/documents/publications/fiches-indo-pacifique/2023/anglais/No.4%20-%20Military%20presence%20and%20defence%20diplomacy.pdf
36. R Sharma, "UNSC Reform and India's Candidacy: A Critical Analysis," *Journal of Defense Studies,* 10, no. 3 (2016): 37-51,; P Saroj and A Choudhury, "India's quest for Permanent Seat at United Nations Security Council: An Analysis," International Journal of Research and Analytical Reviews 5, no. 4 (2018):

been apprehensive of "American Triumphalism."[37] Over the past two decades, India has effectively leveraged its stance of "strategic non-alignment"[38] to its advantage. This extends to the issue of Afghanistan, where both India and France refrained from actively joining the US-led security forces in the war against terrorism. While being a part of the Western alliance system, France consistently seeks to maintain strategic autonomy in its decision-making. This is exemplified by France taking divergent positions from the US on various issues. On the other hand, despite its growing inclination towards the US over the past two decades, India has successfully projected an image of strategic autonomy. This serves as a significant factor for the convergence of interests between Paris and New Delhi. French leadership has even likened India's nuclear policy to Charles de Gaulle's pursuit of strategic autonomy.

Confluence between Arms Import and Export

With a 47% surge in defense exports over the past decade, France has overtaken Russia to become the world's second-largest arms exporter, accounting for 11% of all global arms transfers.[39] The Indian military is one of the key consumers of French-manufactured defense equipment. France's strategic cooperation with India is primarily driven by its commercial approach to arms deals rather than constituting a formal "strategic alliance." France has traditionally adhered to this commercial approach in its policy of supplying military hardware to South Asian countries. Interestingly, at one point in history, both Pakistan and India acquired similar French weapons, such as the Alouette III helicopters.[40]

During the Cold War, France maintained an ambiguous stance on conflicts between Pakistan and India. However, this approach shifted in the post-Cold War era when India appeared to move away from its traditional policy

37. Rakesh Sood, "Emmanuel Macron is new French President: Merci France – says Europe," *Observer Research Foundation*, 10 May 2017. https://www.orfonline.org/research/emmanuel-macron-is-new-french-president-merci-france-says-europe.
38. Saroj K. Aryal and Manish J. Pulami, "India's 'Strategic Autonomy' and Strengthening its Ties with the U.S.," *Przeglad Geopolituczny*, Vol 44, (2023): 116-128.
39. Pieter D. Wezeman, Katarina Djokic, et al., "Trands in International Arms Transfers, 2023," *SIPRI Fact Sheet*, March 2024. https://www.sipri.org/sites/default/files/2024-03/fs_2403_at_2023.pdf.
40. Jerrold F. Elkin and W. Andrew Ritezel, "The Indo-Pakistan Military Balance," *Asian Survey* 26, no. 5 (1986): 526.

of non-alignment and began aligning more closely with Western states.[41] In February 2000, Indian Prime Minister, Atal Behari Vajpayee stated in an interview with a French newspaper that France needed to "make a strategic decision between India, a great democratic power, and Pakistan, a little country under military dictatorship."[42] This statement was effectively a virtual ultimatum to France, urging it to openly choose between the two South Asian countries. It reflected India's view that Franco-Pakistani relations posed a significant obstacle to advancing its defense cooperation with France. As a result, France has adopted pro-India positions on several issues, driven by its close ties with New Delhi.

Following the establishment of a strategic partnership with India, New Delhi has sought to leverage the relationship to secure France's political support in multilateral forums while also expecting France to discontinue arms transfers to Pakistan. Recently, France supported India's stance on terrorism in the aftermath of the Pulwama attack and opposed any formal discussions in the UN regarding Jammu and Kashmir, maintaining that differences between India and Pakistan should be resolved bilaterally.[43] This enhanced strategic cooperation is driven by a combination of commercial interests and shared perceptions and goals shaped at the systemic level. After the collapse of the Soviet Union which was the main supplier of weapons to India, Bharatiya Janata Party (BJP) leaders called for massive investment in India's defense capabilities and urged the government to leverage bilateral relations with strong powers like France.[45] In 1991, the Congress government introduced an economic policy aimed at opening India's market to the global economy and seeking alternative international partners. This policy attracted high-tech and defense sector companies from France, such as Dassault and Aérospatiale, to establish a presence in India. It paved the way for increased Foreign Direct Investment (FDI) and

41. Several experts believe that India's foreign policy in post-Cold War era reflected that non-alignment became irrelevant and lost its meaning. For details, see Arijit Mazumdar, "India's Search for a Post-Cold War Foreign Policy: Domestic Constraints and Obstacles," *India Quarterly*, vol 67, no. 2 (2011): 119.

42. Constance Roger, "Indo-French Defence Cooperation: Friends in Need or Friends Indeed?," *Institute of Peace and Conflict Studies* (March 2007): 21, https://www.files.ethz.ch/isn/55131/IPCS-ResearchPaper7-Constance.pdf

43. "Security situation in Kashmir – Reply by the Ministry for Europe and Foreign Affairs to a written question in the National Assembly," *French Embassy in New Delhi*, 19 November 2019. https://in.ambafrance.org/France-calls-for-restraint-in-Kashmir-dispute.

44. Mazumdar, "India's Search for a Post-Cold War Foreign Policy,": 165-182.

facilitated the entry of multinational corporations into the Indian market.[45] This economic engagement was complemented by France's diplomatic support to India on several key global issues. In January 1998, President Jacques Chirac emphasized that India's exclusion from the global nuclear order was unacceptable and needed to be rectified.

Interestingly, France refrained from condemning India's nuclear tests conducted in Pokhran in 1998. Unlike Russia, it did not support the Clinton Administration's sanctions against India following Pokhran II and even advocated for the lifting of these sanctions.[46] C. Raja Mohan observes that the nuclear tests had the potential to open new avenues for both commercial and political ties between India and France.[47] France portrays India as a responsible nuclear weapons state, basing its position on the notions that India has been a steadfast supporter of non-proliferation, conducted its nuclear tests solely through its capabilities, and firmly opposes exporting its technical knowledge to other countries.[48] Similarly, President Chirac also indicated his support for India securing a permanent seat on the United Nations Security Council (UNSC).

Emmanuel Bonne, the diplomatic advisor to President Macron, reaffirmed France's support for India's bid for a permanent seat on the UNSC during the 36th session of the strategic dialogue between the two states in 2023.[49] France's support for India's stance is rooted in its vision of a multipolar world, as opposed to a US-dominated unipolar order. This is evident in the French political leadership's desire to counter US unilateralism and its concerns about the hegemony of a hyperpower.[50] More recently, France has emerged as one of the major nuclear exporters advocating for an India spec-

45. Sanjay Gupta, "The changing patterns of Indo-French relations: From Cold War estrangement to strategic partnership in the twenty-first century," *French Politic*s, Vol. 7, No. 3/4 (2009): 254.
46. C. Raja Mohan, "India and Nuclear Weapons," IPG 498 (1998): 381, https://library.fes.de/pdf-files/ipg/ipg-1998-4/artmohan.pdf
47. Mohan, "India and Nuclear Weapons."
48. Constance Roger, "Indo-French Defence Cooperation: Friends in Need or Friends Indeed?", *Institute of Peace and Conflict Studies* (March 2007): 11.
49. "France reiterates support for India as a permanent member of UNSC," *Business Standard*, 05 January 2023. https://www.business-standard.com/article/current-affairs/france-reiterates-support-for-india-as-a-permanent-member-of-unsc-123010501186_1.html.
50. Michel Duclos, "Jacques Chirac – The Explorer of the Multipolar World," *Institute Montaigne*, 4 October 2019. https://www.institutmontaigne.org/en/expressions/jacques-chirac-explorer-multipolar-world.

-ific waiver in its bid for membership in the Nuclear Suppliers Group (NSG).[51] These aspects demonstrate France's unequivocal support for India, which serves as a solid foundation for a robust and effective strategic partnership between the two nations. The 2008 White Paper of France highlighted that Asian powers were expected to grow significantly in importance by 2025. It projected that India's gross domestic product could triple over the next two decades and warned that regional conflicts in Asia might spiral out of control.[52]

France recognizes India as a major client for military equipment purchases. Given India's aspirations for an ambitious regional role, which necessitates substantial military modernization, the Indian defense industry presents a vast and lucrative market for French arms exports. According to the Stockholm International Peace Research Institute (SIPRI), France has become the world's second-largest arms exporter, with its arms exports increasing by 47% over the past decade.[53] The surge in France's arms exports is driven by significant demand from countries like India, which has not only emerged as the world's largest arms importer[54] but also as the largest recipient of French arms exports.[55] French defense cooperation with India accounts for 30% of India's total arms imports.[56]

Premier Modi's assertive foreign policy approach has further accelerated defense cooperation between India and France. Following Premier Modi's visit to France in April 2015, French arms exports to India surged by approximately 72% during the period from 2015 to 2019, and this upward

51. Ji Yeon-Jung, "A Path to NSG: India's Rise in the Global Nuclear Order," *Rising Powers Quarterly*, Vol. 2, No. 3 (2017): 25.
52. Bruno Tertrais, "The French White Paper on Defense and National Security: Towards a Stronger and More Streamlined Force," Madrid: Real Instituto Elcano, August 7, 2008, p. 3,; "The French White Paper on Defence and National Security," *Odile Jacob Publishing Corporation* (2008): 33, https://koziej.pl/wp-content/uploads/2015/07/France_White_Paper_English2008.pdf
53. "European arms imports nearly double, US and French exports rise, and Russian exports fall sharply," *Stockholm International Peace Research Institute (SIPRI)*, 11 March 2024. https://www.sipri.org/media/press-release/2024/european-arms-imports-nearly-double-us-and-french-exports-rise-and-russian-exports-fall-sharply.
54. According to SIPRI estimates, India is the largest arms importer with a 9.8% share of all arms imports all around the world. For details, see Wezeman and Djokic, et al., "Trands in International Arms Transfers, 2023," *SIPRI Fact Sheet*, March 2024.
55. "European arms imports nearly double, US and French exports rise, and Russian exports fall sharply," *SIPRI*.
56. "European arms imports nearly double, US and French exports rise.

has continued to date.[57]

Salient Aspects of Indo-French Strategic Cooperation

Indo-French cooperation spans the nuclear, military, and high-technology domains. The two nations formalized their bilateral strategic partnership in January 1998 during French President Jacques Chirac's visit to New Delhi.[58] Within just five months, this partnership faced its first test when France responded moderately to India's nuclear tests and chose to be among the few states that refrained from imposing sanctions on New Delhi.[59] India's decision to trigger a nuclear arms race in South Asia slightly strained its relations with countries such as the US, Germany, Japan, and Australia. However, the French government's moderate stance provided India with the diplomatic breathing room it needed to reassert its status as a so-called responsible nuclear state.

This supportive stance resonated positively with the Indian leadership, further encouraging the establishment of a deeper partnership with Paris. As a result, defense cooperation between the two countries has grown significantly, increasing multifold since then. India has traditionally procured Mirage 2000 aircraft and Scorpène-class submarines from France. In a significant move, India committed to purchasing 126 Rafale aircraft from Dassault Aviation at a time when France faced challenges in securing buyers for this platform. This purchase order not only provided a significant boost to the French defense industry but also strengthened bilateral relations between the two countries.[60] Traditionally, India has relied heavily on Russia for the procurement of defense equipment. However, the acquisition of Rafale jets from France, which boasts a technological edge over the Russian Sukhoi 30 MKI, is altering this dynamic by reducing India's overreliance on Moscow as its primary strategic ally.

57. Elizabeth Roche, "India was world's second-largest arms importer in 2015-19: Report," *Min*t, 10 March 2020. https://www.livemint.com/news/india/arms-imports-from-russia-decreased-in-2015-19-due-to-drop-in-india-sales-report-11583772984894.html
58. Jean-Luc Racine, "The Indo-French Strategic Dialogue: Bilateralism and World Perceptions," in Summit Ganguly, *India as an Emerging Power*, (New Delhi: Routledge, 2003), 153.
59. "Modi's visit to France and Europe-India ties," YouTube video, 1:08:16, posted by "Brookings Institution," 11 July 2023. https://www.youtube.com/watch?v=cHSPSO0PwXw.
60. Mukesh Shankar Bharti, "Indo–French Defense Partnership and Regional Balance in South Asia" *The Copernicus Journal of Political Studies,* No 1-2 (2022): 74.

During President Macron's visit to New Delhi on India's 75th Republic Day, both states announced a "Defense Industrial Roadmap" aimed at deepening collaboration on defense production, with a focus on the joint development of military hardware.[61] The Indo-French defense cooperation seeks to transcend the traditional buyer-seller dynamic by creating synergies between France's expertise in arms production and India's expansive defense market. This defense cooperation operates across four key streams: the exchange of high-level visits, joint military exercises, training and arms procurement, as well as collaborative research and development programs.

India and France regularly engage in strategic dialogues to address global issues. Frequent ministerial and high-level military visits further strengthen agreements and drive cooperative actions between the two states. India and France regularly conduct joint military exercises, including participation in multilateral drills, to enhance interoperability. The Shakti exercises[62] held biennially and alternately in France and India, focus primarily on counter-terrorism operations.[63] Naval exercise Varuna[64] is conducted annually, alternating between the Indian Ocean and the Mediterranean Sea. It focuses on advanced naval operations, including air defense, anti-surface warfare, and anti-submarine warfare.[65] These exercises, conducted since 1983, have become a cornerstone of bilateral cooperation between India and France.[66] These exercises, conducted since 1983, have become a cornerstone of bilateral cooperation between India and France. In the air force domain, the two states regularly hold Exercise Garuda, a key component of their defense collaboration. The most recent iteration took place in Jodhpur, India, from October 26 to November 12, 2022, featuring

61. Suhasini Haider and Dinakar Peri, "India-France Defence Ties Take a Big Leap," *The Hindu*, 30 January 2024. https://www.thehindu.com/news/national/india-france-announce-defence-industrial-roadmap-space-defence-cooperation-after-modi-macron-meet/article67780915.ece.

62. Shakti literally means "power" in Sanskrit. The term is used for the bilateral military exercise conducted between India and France.

63. "France and Security in the Indo-Pacific," Ministere Des Armees, https://franceintheus.org/IMG/pdf/France_and_Security_in_the_Indo-Pacific_-_2019.pdf

64. Varuna refers to a goddess associated with oceans and water. Naval exercises terms as Varuna symbolize maritime cooperation.

65. Dr Sheryn Lee and Dr Ben Schreer, "Europe and the Indo-Pacific: Evolving Security Engagement," in Asia-Pacific Regional Security Assessment 2022: Key Developments and Trends (London: The International Institute for Strategic Studies, 2022), 236.

66. Remy Davison, "Containing the Dragon: The European Pivot to the Indo-Pacific," in Chin-Peng Chu and Sang-Chul Park, eds., Strategies in Changing Global Orders: Competition and Conflict versus Cooperation (Singapore: Springer Nature, 2023), 126.

the participation of Rafale fighter aircraft.[67] These regular military exercises highlight the depth and strength of the security relationship between India and France.

France's vested interests in the "Indo-Pacific" framework act as a catalyst for deepening its collaboration with India. The traditional areas of strategic cooperation have officially expanded to include the maritime domain. In January 2017, India and France signed a White Shipping Agreement, enabling the exchange of information related to commercial shipping. This agreement facilitates the development of a shared maritime awareness to monitor and track movements at sea.[68] This was followed by an agreement in October 2017 to enhance information-sharing arrangements and improve maritime domain awareness. On March 10, 2018, during President Macron's visit to New Delhi, Prime Minister Modi and President Macron signed the Joint Strategic Vision for Cooperation in the IOR.[69] Both sides agreed to strengthen their collaboration in the provision of arms and military logistics, with a particular focus on the western Indian Ocean.[70]

In 2019, Paris and New Delhi signed a Memorandum of Understanding (MoU) on "Joint Maritime Domain Awareness in the Indian Ocean," aimed at enhancing cooperation between the Indian Space Research Organisation (ISRO) and France's National Centre for Space Studies (CNES).[71] This agreement established the foundation for space cooperation between India and France, facilitating collaboration on the joint development of maritime surveillance satellites.These satellites aim to enhance monitoring capabilities across regions spanning from the Mediter-

67. Rajeswari Pillai Rajagopalan, "India, France Conclude Garuda Exercise 2022," *The Diplomat*, 18 November 2022. https://thediplomat.com/2022/11/india-france-conclude-garuda-exercise-2022/; "Exercise Garuda – VII at Air Force Station Jodhpur," Ministry of Defence and Press Information Bureau, 18 October 2022. https://pib.gov.in/PressReleasePage.aspx?PRID=1871611

68. C. Raja Mohan and Darshana M. Baruah, "Deepening the India-France Maritime Partnership," *Carnegie India* (26 February 2018): 5, https://carnegie-production-assets.s3.amazonaws.com/static/files/Mohan_Baruah_Deepening_The_India_France_Maritime_Partnership.pdf,

69. Yong Deng, *China's Strategic Opportunity: Change and Revisionism in Chinese Foreign Policy* (Cambridge: Cambridge University Press, 2022), 180.

70. Deng, *China's Strategic Opportunity: Change and Revisionism in Chinese Foreign Policy.*

71. Mukesh Shankar Bharti & Akshithaa Singh, "India and France bilateral partnership for advancing strategic autonomy in the Indo-Pacific region: Special reference to the Indo-French strategic partnership," *Cogent Social Sciences* Vol 9, No. 1 (2022): 7.

-ranean Sea to the Indian Ocean.[72] This collaborative framework is designed to establish an operational system capable of detecting, identifying, and tracking various ships. With France's military facilities on Réunion and Mayotte islands, these Indo-French agreements are poised to significantly enhance the Indian Navy's operational flexibility, providing it with diversified strategic options in the region.[73]

In the domain of military procurement, the Indian Air Force (IAF) has acquired several major weapons systems from France, including Alouette helicopters, Mirage fighter aircraft, and most notably, 36 nuclear-capable Rafale fighter aircraft. The induction of the Rafale jets has significantly enhanced India's air combat capabilities, further strengthening its strategic edge.[74] The Indian Army has been consistently procuring Milan anti-tank missiles from France since 1984.[75] In the naval domain, one of the most significant agreements is the P-75 Scorpene Project, signed in 2006. This deal involves the procurement of six Scorpene-class submarines for India as part of a joint initiative between the French company Direction des Constructions Navales Services (DCNS) and Mazagon Docks Limited (MDL) in Mumbai.[76] These submarines are being constructed under a transfer of technology (ToT) agreement, which aims to enhance the technical expertise of the Indian defense industry in shipbuilding and submarine construction. This includes critical skills such as hull fabrication and systems integration.[77] Five of the Scorpene-class submarines—INS Kalvari, INS Khanderi, INS Karanj, INS Vela, and INS Vagir—have been commissioned in recent years.[78] The sixth and final submarine, INS Vagsheer

72. "India And France To Jointly Build Maritime Domain Awareness Satellites Starting in 2019," Space Watch Asia Pacific. https://spacewatch.global/2018/08/india-and-france-to-jointly-build-maritime-domain-awareness-satellites-starting-in-2019/

73. Rajeswari Pillai Rajagopalan, "What's behind the rising India-France maritime activity in the Indo-Pacific?," Observer Research Foundation, 27 March 2020. https://www.orfonline.org/research/whats-behind-the-rising-india-france-maritime-activity-in-the-indo-pacific-63753.

74. Gaurav Kampani, "India's Quest for the 'Credible' in the Nuclear Deterrence," in The Oxford Handbook of Indian Politics, eds., Sumit Ganguly and Eswaran Sridharan (Oxford: Oxford University Press), 599.

75. B. Krishnamurthy, Indo-French Relations: Prospects and Perspectives (Michigan: Shipra Publications, 2008), 72.

76. Priya Tyagi, "Aerospace and Defence News," in Indian Defence Review, ed., Bharat Verma 27, no. 3 (2012): 59-72.

77. Shreya Sinha, "India's Military Modernization: Role and Impact of France," *Journal of Asian Security and International Affairs*, vol 10, no. 3 (2023): 325-341.

78. "India's Military Modernization: Role and Impact of France," *Journal of Asian Security and*

heer, was launched in April 2022. India has initiated a new deal worth USD 6 billion for the procurement of 26 Rafale Marine aircraft, aimed at bolstering the Indian Navy's expanding aircraft carrier capabilities.[79] Reportedly, France has responded positively to India's tender for the 26 Rafale Marine aircraft. If the deal is successfully finalized, it will increase India's total inventory of Rafale aircraft to 62.[80] The Rafale Marine is a modified version of the original Rafale aircraft, designed specifically to meet maritime operational requirements. It is currently deployed on the French Navy's aircraft carrier, Charles de Gaulle. Once deployed aboard INS Vikrant, the Rafale Maritime will significantly enhance the Indian Navy's power projection capabilities, strengthening its ability to maintain sea control and dominance in the IOR.

The Indo-French joint research and development programs play a pivotal role in advancing New Delhi's "Make in India" initiative by supporting the growth of its indigenous and state-controlled defense industry. Notably, Safran, a leading high-tech industrial group in France, has contributed significantly by manufacturing rocket propulsion systems for India's Vikas and Ariane rockets, which are integral to India's space launch capabilities.[81] Safran has a long-standing partnership with Hindustan Aeronautics Limited (HAL), collaborating on the production of Shakti (Ardiden) engines for helicopters and components for Rafale aircraft.[82] The French company Snecma collaborates with India's DRDO in developing Kaveri engines for the IAF. Additionally, French company GIAT Industries partners with DRDO in the production of light tanks. The seven largest French defense companies, spanning aerospace, naval, and land sectors, actively participated in the Indian DefExpo held in February 2020. Additionally, DRDO and the French company MBDA are collaborating

Security and International Affairs,; Xavier Vavasseur, "Indian Navy Commissions 5th Scorpene Submarine INS Vagir," *Naval News*, 23 January 2023. https://www.navalnews.com/naval-news/2023/01/indian-navy-commissions-5th-scorpene-submarine-ins-vagir/.

79. Manjeet Negi, "France responds to India's bid for acquisition of 26 Rafale Marine fighters," *India Today*, 20 December 2023. https://www.indiatoday.in/india/story/rafale-marine-aircraft-france-indian-navy-ins-vikrant-ins-vikramaditya-defence-ministry-arms-deal-2478550-2023-12-20.

80. "Indian, French governments negotiating 26 Rafale marine fighter jet deal," *Business Standard*, 14 June 2024. https://www.business-standard.com/external-affairs-defence-security/news/indian-french-governments-negotiating-26-rafale-marine-fighter-jet-deal-124061400348_1.html.

81. "Fifty years of Indo-French Space Cooperation," *Diplomacy and Beyond*, 4 April 2017. https://diplomacybeyond.com/india-france-indo-french-space-co-operation/.

82. "We propose full technology transfer for engine to power next gen fighters: French manufacturer Safran," *The Economic Times*, 05 Feb 2020.

on the joint development of short-range surface-to-air missiles (SR-SAM) tailored for Indian naval defense applications. In the civil nuclear cooperation sector, the Indo-US nuclear deal played a transformative role by opening the international nuclear market to India, enabling access to nuclear fuel supplies, reactors, and other related equipment and facilities. However, even before the US Congressional approval of the Indo-US nuclear deal, France became the first NSG member state to sign an MoU with India in September 2008. Before this, in March 1983, the two countries had signed an agreement for the supply of enriched uranium to fuel the US-built nuclear power plant at Tarapur.[83] In April 1992, French officials announced their unwillingness to extend the supply agreement for enriched uranium unless India agreed to implement full-scope safeguards under the supervision of the International Atomic Energy Agency (IAEA).[84]

On 30 September 2008, India and France signed a landmark nuclear energy agreement that allowed New Delhi to procure nuclear equipment and fuel.[85] In 2008, French company Areva signed an agreement with the Nuclear Power Corporation of India (NPCIL) to supply 300 tons of uranium annually. Additionally, a deal worth US$ 12.3 billion was signed for the construction of six nuclear power plant (NPP) units in Jaitapur, Maharashtra.[86] In 2011, the French Ambassador to India affirmed that the NSG decision to restrict the transfer of enrichment and reprocessing (ENR) technologies to non-NPT signatories did not undermine the waiver granted to India in 2008. He emphasized that "nothing in the existing and future guidelines shall be interpreted as detracting from that exemption."[87] France's commercial interests significantly influence its nuclear diplomacy and its support for India's potential inclusion in the NSG, despite India not being a signatory to the NPT. In 2010, France, alongside the US, encouraged Japan to finalize a nuclear agreement with India.

83. "AROUND THE WORLD; France Signs Agreement On Uranium for India," *New York Times*, 25 March 1983. https://www.nytimes.com/1983/03/25/world/around-the-world-france-signs-agreement-on-uranium-for-india.html

84. "India Nuclear Chronology," *Nuclear Threat Initiative*, December 2010. https://media.nti.org/pdfs/india_nuclear.pdf

85. Jaclyn Tandler, "French Nuclear Diplomacy," *The Non-Proliferation Review*, Vol 12, No. 2 (2014): 125-148.

86. Mukesh Shankar Bharti and Akshithaa Singh, India and France bilateral partnership for advancing strategic autonomy in the Indo-Pacific region: Special reference to the Indo-French strategic partnership," *Cogent Social Sciences*, Vol 9, No. 1 (2023): 10 and Sitakanta Mishra, "India's Civil Nuclear Network: A Reality Check," Air Power Journal, Vol 5, No. 4 (2010): 117.

87. Satish Kumar, ed., *Indian's National Security Review 2012* (New Delhi: Routledge, 2012)

More recently, India and France have engaged in discussions on an agreement to collaborate on the development of small modular nuclear reactors (SMRs).[88] In addition to supporting India's membership in the Missile Technology Control Regime (MTCR), France actively backs India's bid for inclusion in the other three major multilateral export control regimes: the NSG, the Wassenaar Arrangement, and the Australia Group.

Impact on Regional Stability and Global Nuclear Norms

The strategic cooperation between India and France significantly contributes to India's increasingly assertive military posture. In August 2019, Prime Minister Modi described New Delhi's relationship with Paris as an "alliance."[89] The growing convergence of interests between India and France, coupled with their continuous military cooperation—largely driven by commercial interests rather than shared strategic objectives—has raised concerns about its negative impact on strategic stability in South Asia.

The French leadership regards India as a stabilizing factor in South Asia, partly due to the perceived threat of China's growing influence, and uses this rationale to justify the sale of military equipment to India's vast defense market. However, France's supply of nuclear-capable Rafale fighter jets raises concerns about undermining the spirit of global non-proliferation norms by transferring nuclear-capable delivery systems to a non-NPT signatory. This move not only challenges the principles of non-proliferation but also risks destabilizing strategic stability in South Asia, where heightened military capabilities could further escalate regional tensions. Despite upgrades to the existing fleet of the IAF, the Rafale is likely to assume the role of air-based nuclear strike capability. In the French Air Force,[90] The Rafale is equipped to carry the Air-Sol Moyenne Portée-Amélioré (ASMP-A) nuclear cruise missile. These fighter jets have been used in exercises to rehearse nuclear strike missions, demonstrating their capability to deliver nuclear warheads effectively.

88. Sudhi Ranjan Sen, Rajesh Kumar Singh, and Ania Nussbaum, "France and India to Discuss Accord on Small Nuclear Reactors," Bloomberg, 24 January 2024. https://www.bloomberg.com/news/articles/2024-01-24/france-and-india-discuss-partnering-on-small-nuclear-reactors-as-macron-visits.

89. "Modi's visit to France and Europe-India ties."

90. Yogesh Joshi, Frank O'Donell and Harsh V. Pant, "India's Evolving Nuclear Force and its Implications for U.S. Strategy in the Asia-Pacific," Strategic Studies Institute, U.S. Army War College (June 2016): 8.

In May 2024, France successfully tested an upgraded version of the nuclear-capable ASMP-A missile, launched from a Rafale fighter jet.[91] In addition to France's submarine-based nuclear capabilities, Rafale's employment in a nuclear role is a key component of its overall nuclear deterrence strategy. Experts highlight that the Rafale is already utilized for nuclear missions in the French Air Force, suggesting that India could potentially adapt the aircraft to serve a similar role within the IAF.[92] As an 'omnirole' aircraft, the anticipated induction of 26 Rafale Marine aircraft into the Indian Navy for deployment on aircraft carriers is expected to significantly bolster the Navy's contribution to New Delhi's nuclear triad. Given the Rafale's advanced capabilities, it would be unrealistic for India's adversaries to view this aircraft solely as a conventional asset. The Rafale is capable of carrying various types of warheads, including nuclear payloads, while achieving a maximum speed of Mach 1.8.[93] The Rafale is equipped with highly advanced and lethal missiles capable of striking targets with remarkable accuracy, achieving a circular error probable (CEP) of 8-10 meters.[94] The Rafale is equipped with laser designation pods for precision targeting in air-to-ground operations, alongside advanced electronic warfare capabilities.

These systems enable the aircraft to simultaneously track up to eight different targets, significantly enhancing its situational awareness, combat effectiveness, and ability to engage multiple threats in dynamic operational environments. The Rafale aircraft is equipped with the Meteor, one of the most advanced beyond visual range (BVR) air-to-air missiles. With a striking range of 120-150 km, the Meteor is a strategic weapon that provides the Rafale with a significant advantage in air superiority.[95] Reports indicate that the Rafale aircraft will be deployed in two equally sized squadrons: one at an air base in West Bengal and the other at the Ambala

91. "France Successfully Tests Launch of Upgraded ASMPA_R Nuclear-Capable Missile from Rafale Fighter," *Global Defence News*, 22 May 2024. https://armyrecognition.com/news/aerospace-news/2024/france-successfully-tests-launch-of-upgraded-asmpa-r-nuclear-capable-missile-from-rafale-fighter.

92. Hans M. Kristensen & Matt Korda,"Indian nuclear forces, 2018," *Bulletin of Atomic Scientists*, Vol. 74, No. 6 (2018): 363.

93. "Dassault Rafale and FA-18E Super Hornet," *Armed Forces*, https://armedforces.eu/compare/multirole_aircraft_Dassault_Rafale_vs_FA-18E_Super_Hornet

94. "France confirms delivery of 600 AASM guided bombs to Ukraine," *Global Defence News*, 19 January 2024. https://armyrecognition.com/news/army-news/2024/france-confirms-delivery-of-600-aasm-guided-bombs-to-ukraine.

95. Gilles Bouqerat, "France and South Asia," in Sumit Ganguly and Frank O'Donnell, eds., *Routledge Handbook of International Relations of South Asia* (New Delhi: Taylor and Francis, 2022).

Air Base Station, which is strategically located just 220 kilometers from the Pakistani border.[96] Rafale fighters would enhance India's offensive capabilities by providing the ability to launch standoff weapons for counterforce strikes. This capability allows India to execute both short and long-range missions against Pakistan. By offering a combination of air superiority and advanced reconnaissance capabilities, the Rafale fighter jet could potentially tempt Indian leadership—particularly those inclined toward counterforce strategies—to consider employing it in a nuclear first-strike role.[97] This would involve targeting selected military assets on land and at sea with precision strikes. This potential for escalation is underscored by remarks made by Prime Minister Narendra Modi following the February 2019 crisis. He expressed regret over the absence of the French Rafale fighter jets, suggesting that their presence could have yielded better outcomes for the IAF in its close engagements with the Pakistan Air Force.[98]

Therefore, Rafale fighter jets are not merely force multipliers; they pose a broader strategic risk by potentially undermining the nuclear deterrent capability of adversaries. This capability could destabilize the delicate balance of deterrence in South Asia. It is important to recognize that the acquisition of the Rafale fighter jets is occurring amid growing concerns about the potential erosion of India's No First Use (NFU) nuclear doctrine. These concerns are compounded by India's increasingly assertive posture and its willingness to contemplate pre-emptive nuclear first strikes against Pakistan.[99]

South Asian strategic stability is already undermined by existing military asymmetries, and India's ongoing force modernization further exacerbates this imbalance. Despite having greater military resources compared to its regional counterparts, India has, in recent years, significantly expanded its capabilities. These include acquiring a diverse range of nuclear-capable delivery systems, ballistic missile defense (BMD) systems, and anti-satellite

96. Dinakar Peri, "Five Rafales arrive at Ambala airbase," *The Hindu*, 29 July 2020. https://www.thehindu.com/news/national/rafale-jets-ambala-induction/article61678277.ece.
97. Christopher Clary and Vipin Narang, "India's Counterforce Temptations: Strategic Dilemmas, Doctrine, and Capabilities," *International Security*, Vol 43, No 3 (2019): 7-52.
98. Shishir Gupta, "If we had Rafales, we'd have shot down 4-5 Pakistani jets after Balakot: IAF ex-chief Dhanoa," *The Print*, 20 February 2020. https://theprint.in/defence/if-we-had-rafales-wed-have-shot-down-4-5-pakistani-jets-after-balakot-iaf-ex-chief-dhanoa/363080/.
99. Aqeel Akhtar and Sufian Ullah, "India's Sea-based Nuclear Forces and Strategic Stability in South Asia," *Australian Journal of Maritime and Ocean Affairs*, Vol 15, No. 1 (2023): 54-68.

(ASAT) weapons, as well as developing a substantial stockpile of fissile material. Additionally, India has incorporated other force multipliers, such as supersonic delivery systems, which enhance its first-strike and counterforce capabilities, further unsettling the strategic equilibrium in the region.[100] The continued support for India's military modernization by major powers, including France, exacerbates instability in the South Asian region. This support disrupts the military balance and fuels India's ambitions of establishing hegemony and supremacy in the IOR.[101] By developing a blue-water navy, India aspires to establish pre-eminence in the IOR and extend its influence beyond. This self-assumed role as a regional policeman drives India to adopt an increasingly offensive posture, with the likelihood of leveraging its enhanced naval capabilities to assertively pursue its strategic interests.

As India seeks to dominate the Indian Ocean, it may also aim to counterbalance and potentially deny China's influence in the South China Sea in the coming years. India's Act East policy seeks to enhance its strategic presence in regions like the Strait of Malacca and the South China Sea, which it views as secondary areas of maritime interest.[102] Strengthening its role in these regions would grant India access to the Western Pacific, enabling potential joint operations with the US Navy. The Indian Navy is steadily increasing its presence in the South China Sea and surrounding regions through a variety of initiatives. These include participation in bilateral and multilateral naval exercises, such as the MILAN exercises, and pursuing defense partnerships with countries like Vietnam, Brunei, and the Philippines.[103] India's increasing control over sea lines of communication (SLOCs)—under the pretext of a net security provider—positions it to establish sea control and dominance in the region. While this strategy bolsters India's maritime influence, it runs counter to the interests of regional states, including Pakistan, as it may limit their access and operational freedom in these critical waterways.[104]

100. Rizwana Abbasi and Sufian Ullah, "Rising Strategic Instability and Declining Prospects for Nuclear Disarmament in South Asia: A Pakistani Perspective," *Asian Journal of Peacebuilding*, Vol 10, No. 1 (2022): 215-241.
101. Liliang You, "Looking at the "Security Dilemma" between India and Pakistan from Structural Realism," *Advances in Social Science, Education and Humanities Research* 325 (2019): 114.
102. *Ensuring Secure Seas: Indian Maritime Security Strategy* (New Delhi: Indian Navy, 2015): 32.
103. Sufian Ullah, "Analysing India's Naval Development Strategy," *IPRI Journal*, Vol. 19, No. 1 (2019): 86-110.
104. Sufian Ullah and Zeeshan Hayat, "India as a Net Security Provider in Indo-Pacific and

These developments exacerbate concerns and could undermine France's declared interest in maintaining stability in the region. Countries like Pakistan would likely feel compelled to adopt additional security measures to protect their vital trade routes and maritime interests within their extended EEZ. Given India's aspirations to extend its naval reach to critical chokepoints such as the Straits of Hormuz, the acquisition of enhanced capabilities for sustained maritime operations raises the likelihood of interactions—and potential confrontations—between adversarial navies. If India continues to maintain opacity regarding the co-mingling of strategic and conventional assets, such as deploying nuclear-capable missiles on surface vessels, this ambiguity could significantly heighten the risk of miscalculation during a military confrontation. Adversaries might interpret such deployments as strategic threats, potentially escalating conflicts to the nuclear level.

The Indo-French nuclear cooperation poses another challenge to strategic stability in South Asia. France was the first country to sign a civil nuclear cooperation agreement with India following the exceptional NSG waiver granted to India in 2008. Reports further indicate that French defense company Thales has expressed interest in assisting India in the construction of its fleet of nuclear-powered attack submarines (SSNs).[105] In this regard, a detailed presentation on the Barracuda-class – France's latest low-enriched uranium (LEU) fuelled nuclear-powered attack submarine (SSN) – was given to the visiting Indian Chief of Naval Staff in November 2017.[106] Given French expertise in the manufacturing of nuclear submarines and India's aspirations for a large fleet of nuclear submarines, cooperation between New Delhi and Paris on military nuclear propulsion and other sensitive areas is possible. The likelihood of deeper Indo-French collaboration in the nuclear domain has increased in the wake of the AUKUS deal. The AUKUS agreement, which saw Australia abandon a longstanding submarine deal with France at the last moment to instead acquire nuclear-powered attack submarines from the US and UK, strained France's ties with

Implications for the Region," *NUST Journal of International Peace & Stability*, Vol. 4, No. 1 (2021): 26-39

105. "Thales Looking At Role In India's Nuclear Submarine Project," *Indo-French Chamber of Commerce*, 22 April 2018. https://www.ifcci.org.in/communication/news/n/news/thales-looking-at-role-in-indias-nuclear-submarine-project.html.

106. Yusuf Unjhawala, "French Barracuda Project's Utility to India," *Live Mint*, 29 November 2017. https://www.livemint.com/Opinion/rqltXdEokaHko48UWoc7CN/French-Barracuda-projects-utility-to-India.html.

with both countries. It encouraged France to ally with India. The advocates of possible Indo-French collaboration propagate that in the event of visible French distrust towards the US and the UK, India could use the opportunity to procure a nuclear-attack submarine from France.[107] Ashley Tellis, a prominent Indian-American expert in Washington, DC, has proposed the concept of a trilateral arrangement called INFRUS, involving India, France, and the US. Under this framework, Washington could potentially encourage Paris to share naval nuclear propulsion technology with New Delhi.[108] While many such proposals are framed under the pretext of the "China threat theory," which underscores Beijing's expanding influence as a shared concern for the US, India, and France, the broader systemic implications of these developments on the international nuclear order are often overlooked.

India's plans to develop and operate a fleet of nuclear-powered submarines alongside a robust sea-based nuclear deterrent could significantly impact global non-proliferation efforts if the proposed INFRUS arrangement materializes. Any collaboration between India and France involving nuclear-powered submarine technology would raise critical concerns about the potential misuse or diversion of nuclear technologies and expertise for military purposes. India already maintains eight nuclear reactors and a substantial stockpile of reactor-grade plutonium—usable for weapons production—outside the safeguards of the IAEA.[109] France has transitioned to using low-enriched uranium (LEU) for its nuclear submarine propulsion,[110] a move aligned with non-proliferation norms. In contrast, India continues to rely on highly enriched uranium (HEU) for its naval propulsion requirements.[111]

107. Rahul Jaybhay, "The AUKUS Deal and India's Submarine Dilemma," *The Diplomat*, 14 April 2023. https://thediplomat.com/2023/04/the-aukus-deal-and-indias-submarine-dilemma/.
108. Ashley J. Tellis, "Striking Asymmetries: Nuclear Transitions in Southern Asia," *Carnegie Endowment for International Peace* (2022): 256. https://carnegie-production-assets.s3.amazonaws.com/static/files/202207-Tellis_Striking_Asymmetries-final.pdf
109. Mansoor Ahmed, "India's Nuclear Exceptionalism: Fissile Materials, Fuel Cycles, and Safeguards," *Harvard Kennedy School, Belfer Center for Science and International Affairs*, May 2017. https://www.belfercenter.org/sites/default/files/files/publication/India%27s%20Nuclear%20Exceptionalism.pdf
110. Alain Tournyol du Clos, "France's Choice for Naval Nuclear Propulsion: Why Low Enriched Uranium was Chosen," *Federation of American Scientists* (2016): 2, https://uploads.fas.org/2016/12/Frances-Choice-for-Naval-Nuclear-Propulsion.pdf
111. Sufian Ullah, "India's Naval Nuclearization: Repercussions for Crisis Stability," *South Asian Voices*, 27 June 2018. https://southasianvoices.org/indias-naval-nuclearization-repercussions-stability/.

Providing India with nuclear-powered submarines without imposing additional obligations to advance arms control or disarmament could further detach India's nuclear program from international oversight and commitments. Such assistance risks enabling India to focus its HEU resources on aggressive nuclear posturing.[112] In addition, India's enhanced civil nuclear capabilities may facilitate its nuclear weapons modernization, due to difficulties in the verification of dual-use goods. Through foreign cooperation with several countries including France, India will be receiving large quantities of fissile material for its civilian nuclear program allowing it to divert all its domestic reserves into the production of nuclear weapons.[113] This is more probable because India does not have a Comprehensive Safeguards Agreement with the IAEA and only applies facility-specific safeguards in its declared civil nuclear facilities.[114] Several studies highlight that India is currently the fastest-growing nuclear weapons state, with stockpiles sufficient to produce over 2,600 nuclear weapons.[115]

The Indo-French civil nuclear cooperation, by enabling a non-NPT signatory to access nuclear technologies, undermines the spirit of the international non-proliferation regime. This approach appears discriminatory, as it selectively permits India to benefit from global nuclear commerce while other non-signatories face restrictions. The credibility of the already strained non-proliferation regime depends on abandoning discriminatory practices and adopting rules-based measures that apply universally. India's access to the global nuclear market without committing to obligations under treaties like the NPT and the Comprehensive Nuclear-Test-Ban Treaty (CTBT) raises serious concerns. It not only sets a troubling precedent but also reduces New Delhi's incentives to pursue future disarmament and arms control measures.

112. Akhtar and Ullah, "India's Sea-based Nuclear Forces and Strategic Stability in South Asia."
113. "The South Asian Nuclear Balance: An Interview With Pakistani Ambassador to the CD Zamir Akram," *Arms Control Association.* https://www.armscontrol.org/act/2011-12/south-asian-nuclear-balance-interview-pakistani-ambassador-cd-zamir-akram
114. Muhammad Waseem Qutab, "NSG Membership for India and Pakistan: Debating 'Critical' Aspects," *IPRI Journal*, Vol 19, No. 1 (2019): 2.
115. Ahmed, "India's Nuclear Exceptionalism," and Syed Saddam Hussain Shah and Syed Javaid Khurshid, "Estimating India's Nuclear Weapons-Producing Capacity," *Bulletin of the Atomic Scientists,* 2 November 2018. https://thebulletin.org/2018/11/estimating-indias-nuclear-weapons-producing-capacity/.

Conclusion

The evolving Indo-French strategic alliance gains significance against the backdrop of growing multipolarity in the international system. Both states pursue distinct yet interconnected geopolitical ambitions, particularly in the broader Asia-Pacific region recoined as Indo-Pacific and within the global system, fostering a closer partnership. This paper has examined the key drivers and strategic convergences that strengthen the partnership between New Delhi and Paris. Among these, the pivot to the "Indo-Pacific" to counter China's rise, shared aspirations to partially modify the international order, and the alignment of interests as one of the world's largest arms importers (India) and exporters (France) emerge as pivotal forces nurturing this symbiotic relationship.

By exploring the salient aspects of Indo-French bilateral ties, including defense cooperation, nuclear collaboration, and maritime security, the paper analyzes the potential ramifications of this growing partnership on regional stability. It highlights how the relationship could further disrupt the fragile security dynamics in South Asia by exacerbating existing military imbalances. Additionally, the discussion extends to the impact on global nuclear norms, emphasizing how exceptions made for India in the context of non-proliferation frameworks could weaken the credibility of international regimes like the NPT.

Since formalizing their bilateral strategic partnership in January 1998, India and France have significantly expanded their collaboration across various domains, including nuclear technology, military capabilities, and other advanced technological fields. Key milestones in this cooperation include the procurement of Mirage 2000 aircraft, Scorpene-class submarines, and Rafale fighter jets, as well as joint military exercises such as Shakti, naval exercises like Varuna, and collaborative projects in maritime surveillance satellites. Additionally, France's consistent support for India's membership in major export control regimes—beyond the MTCR—including the NSG, Australia Group, and Wassenaar Arrangement, underscores the depth of this partnership. This paper concludes that the bilateral strategic cooperation between India and France contributes to the former's increasingly assertive military posture and adversely impacts strategic stability in South Asia.

3

Artificial Intelligence and Climate Change: Response to Climate-Induced Disasters in Pakistan

Artificial Intelligence and Climate Change: Response to Climate-Induced Disasters in Pakistan

Jugnoo Aijaz[*] *and Adil Sultan*[*]

Abstract

Pakistan is grappling with the impacts of climate change, which have intensified the severity of disasters such as flash floods, glacial lake outbursts, droughts, and heat waves. These challenges pose serious threats to the country's livelihoods and economy. One of the several ways to mitigate the impacts of climate change is by utilizing Artificial Intelligence (AI) for data gathering and analysis. This approach can help reduce the increasing frequency of major losses to life and property. However, several systemic challenges hinder progress, including inadequate infrastructure, the unavailability of required data and its proper representation, a lack of skilled manpower, endemic corruption, and a poor governance system. This paper analyzes the UN's efforts to incorporate AI technology into climate mitigation and adaptation strategies, while examining various models employed by countries such as the United States, China, and Japan. The established practices of these countries could serve as a foundation for developing a Pakistan-specific model for flood risk management, disseminating disaster-related information, delivering early weather forecasts, and analyzing potential damage to infrastructure.

Keywords: Climate Change, Artificial Intelligence, Climate-Induced Disasters, Adaptation, United Nations.

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Introduction

Pakistan is one of the most affected countries by climate change, ranking as the "8th most vulnerable country to the climate crisis."[1] This vulnerability manifests in various forms, including flash floods, glacial lake outbursts, droughts, and extreme heat waves, all of which pose numerous challenges to the country.[2] The adverse effects of climate change have intensified in recent years, causing severe damage across multiple sectors in Pakistan. The increasing frequency and severity of climate-related disasters highlight the shortcomings of traditional approaches to managing climate-induced disasters, which have largely proven ineffective. Pakistan, therefore, needs to adopt a proactive approach to developing strategies that enhance its adaptation to climate change.[3]

Emerging technologies present significant opportunities for Pakistan to improve its resilience and adaptation efforts in the face of climate-related challenges. Integration of these technologies, particularly AI, can greatly improve the prediction and management of climate change while strengthening resilience to combat the climate crisis. In this context, ClAI serves as an assistive tool that supports and augments human efforts in adapting to and mitigating the effects of the climate crisis, complementing rather than replacing human intervention.[4] This paper explores how Pakistan can leverage AI in managing climate-induced disasters. AI can play a critical role in disaster preparedness by enhancing early warning systems, enabling the prediction of impending disasters, and facilitating timely responses to mitigate their impact.[5]

1. United Nations Development Programme, "Climate Promise – II," *UNDP.* https://www.undp.org/pakistan/projects/climate-promise-ii.
2. Relief Web, "Melting glaciers, growing lakes and the threat of outburst floods – Pakistan," August 26, 2022. https://reliefweb.int/report/pakistan/melting-glaciers-growing-lakes-and-threat-outburst-floods
3. Zain Ul Abideen Siddiqui, "Pakistan's first-ever climate change plan unveiled," *The Express Tribune,* July 26, 2023. https://tribune.com.pk/story/2427999/pakistans-first-ever-climate-change-plan-unveiled
4. Donald Thompson, "Assistive AI, Not Autonomous AI, Is the Path to Improved Operational Efficiencies," *Forbes*, December 21, 2017. https://www.forbes.com/sites/forbestechcouncil/2017/12/21/assistive-ai-not-autonomous-ai-is-the-path-to-improved-operational-efficiencies/.
5. Harshita Jain and Renu Dhupper. "Ai-Enabled Strategies for Climate Change Adaptation: Protecting Communities, Infrastructure, and Businesses from the Impacts of Climate Change," *Computational Urban Science.*

AI technology can also contribute to effective disaster response by identifying and prioritizing vulnerable communities or infrastructure. Additionally, AI-powered chatbots can assist emergency responders and government agencies by facilitating communication, providing real-time updates, and offering guidance for first aid and humanitarian assistance.[6] The potential application of AI can enable Pakistan to develop more efficient adaptation strategies, which are crucial for reducing the adverse impacts of climate-induced disasters. These advancements are particularly essential for countries like Pakistan, where vulnerability to climate change poses significant challenges that require immediate and innovative solutions.

Adaptation requires significant changes in ecological, social, or economic systems in response to climate stimuli and their effects.[7] Mitigation, on the other hand, involves methods to reduce greenhouse gas emissions, which are the primary drivers of climate change. While Pakistan's climate change policy encompasses both mitigation and adaptation, this paper focuses on strengthening Pakistan's adaptation strategies to address the challenges posed by climate change effectively. Pakistan is not a major contributor to greenhouse gas emissions, yet it remains one of the countries that are severely affected by climate change. The fifth Assessment of the Intergovernmental Panel on Climate Change (IPCC) highlights Pakistan's limited adaptive capacity.[8] According to the IPCC Fifth Assessment Report, Pakistan's agriculture and energy sectors are expected to experience significant impacts from climate change.[9] Given that Pakistan's economy is heavily reliant on these two critical sectors, a comprehensive approach to adaptation is essential. This approach should focus on reducing vulnerability by integrating AI technology to enhance resilience and ensure sustainable development.

https://www.researchgate.net/publication/372458556_AI-enabled_strategies_for_climate_change_adaptation_protecting_communities_infrastructure_and_businesses_from_the_impacts_of_climate_change

6. Charlotte Lancaster, "Can Artificial Intelligence Improve Humanitarian Responses?" *UNOPS*. October 25, 2018. https://www.unops.org/news-and-stories/insights/can-artificial-intelligence-improve-humanitarian-responses

7. UNFCC, "Adaptation and Resilience." https://unfccc.int/topics/adaptation-and-resilience/the-big-picture/introduction#:~:text=Adaptation%20refers%20to%20adjustments%20in,climatic%20stimuli%20and%20their%20effects

8. Qamar Uz Zaman Chaudhry, "Climate change profile of Pakistan," 2017. https://www.adb.org/sites/default/files/publication/357876/climate-change-profile-pakistan.pdf

9. Chaudhry, "Climate change profile of Pakistan."

This paper explores how Pakistan can incorporate AI technology to adapt to climate-induced disasters. The first section of this study examines the problem of climate change and the UN's efforts to address it. The second section analyzes the impacts of climate change on Pakistan. The third section focuses on the role of AI in combating climate change examining the established AI models used by the United States, China, and Japan for climate disaster response. The fourth section explores the potential for integrating AI technology in Pakistan to enhance climate adaptation strategies. The last section of the paper addresses the possible challenges Pakistan may face in adopting AI technology for this purpose.

Global Efforts to Combat Climate Change

The effects of climate change range from shifting weather patterns to the melting of glaciers, which contribute to rising sea levels and, ultimately, an increased frequency of floods. These changes result from long-term shifts in temperatures and weather patterns driven by human activities, particularly the burning of fossil fuels such as coal, oil, and gas.[10] To reduce the burning of fossil fuels, the UN has established a common platform under the United Nations Framework Convention on Climate Change (UNFCCC), enabling countries to negotiate, discuss, and agree on climate-related actions aimed at reducing greenhouse gas emissions. This convention has resulted in several significant agreements, including the Kyoto Protocol, the Paris Agreement, and the Glasgow Climate Pact.[11]

The primary objective of the UNFCCC was to recognize the climate crisis as a global issue and to minimize human interference in the climate system.[12] The UNFCCC organized regular meetings among the ratifying parties, known as the Conference of the Parties (COP).[13] These meetings led to the first successful agreement at COP 3 in Kyoto, resulting in the Kyoto Protocol, the first legally binding climate treaty. However, the Kyoto Protocol and subsequent agreements failed to achieve significant reductions rise in global temperatures. This failure eventually prompted states to prio-

10. United Nations, "What Is Climate Change?" *United Nations*, https://www.un.org/en/climatechange/what-is-climate-change.
11. Lindsay Maizland, "UN Climate Talks," *Council on Foreign Relations,* September 18, 2019. https://www.cfr.org/timeline/un-climate-talks
12. Maizland, "UN Climate Talks."
13. "UN Climate Talks."

-ritize adaptation strategies, culminating in the adoption of the Paris Agreement at COP 21.[14] The new agreement promised funding to poor and more vulnerable countries for developing programs and policies that could facilitate adaptation. The UN's various climate financing projects aim to support developing countries in addressing the issue of climate change. These projects are funded by developed countries due to their greater economic capacity and their significant responsibility for the looming climate catastrophe.[15] Despite promises made by these polluters, many have failed to fulfill their climate financing obligations of US $100 billion annually by 2020, which could have significantly aided developing nations in adapting to the climate crisis.[16]

The transition to clean energy and the development of adaptation strategies can only be achieved if vulnerable countries, like Pakistan, receive the promised financial support from major industrialized nations. At COP-26, Pakistan strongly emphasized that achieving a "total target of 50 percent emissions reductions by 2030 is only possible if US $100 billion is provided to facilitate a clean and just energy transition."[17] This appeal may have influenced the participants of COP-27 to establish funds aimed at compensating poor and vulnerable countries. At the subsequent COP-28, held in Dubai, further commitments were made by the participants to support these efforts.[18] The main highlight of COP-28 was the establishment of the "Loss and Damage and Adaptation Fund," which is crucial for countries like Pakistan to mitigate the negative impacts of looming climate-induced disasters.[19] As vulnerable countries work on developing new policies and strategies, they should also leverage emerging technologies, such as AI, which can offer innovative solutions to address the challenges posed by climate change.

14. United Nations, "The Paris Agreement," https://www.un.org/en/climatechange/paris-agreement.
15. United Nations Climate Change, "Introduction to Climate Finance," https://unfccc.int/topics/introduction-to-climate-finance
16. Fiona Harvey, "Rich Countries Hit $100bn Climate Finance Goal Two Years Late, Data Shows," *The Guardian*, November 16, 2023. https://www.theguardian.com/global-development/2023/nov/16/rich-countries-hit-climate-finance-goal-two-years-late-data.
17. Aron White, "We don't believe in Net-zero at the Moment- Pakistan's top climate official at COP26," *Dawn*, November 4, 2021. https://www.dawn.com/news/1655944.
18. Fiona Harvey, "Cop27 Agrees Historic 'Loss and Damage' Fund for Climate Impact in Developing Countries," *The Guardia*n, November 20, 2022. https://www.theguardian.com/environment/2022/nov/20/cop27-agrees-to-historic-loss-and-damage-fund-to-compensate-developing-countries-for-climate-impacts.
19. Cristen Hemingway Jaynes, "COP28 Agrees to Establish Loss and Damage Fund for Vulnerable

Impact of Climate Change on Pakistan

One of the most significant climate-related challenges Pakistan has faced in recent decades is flooding. The August 2024 report by the National Disaster Management Authority (NDMA) identified an unprecedented monsoon season as the primary cause of heavy rainfall across the country, which led to widespread flooding, substantial damage to infrastructure, and the tragic loss of 196 lives.[20] UN Secretary-General, António Guterres famously described the 2022 floods as "a monsoon on steroids."[21] Unfortunately, the floods continued to wreak havoc in 2023, further compounding the challenges for the nation.

Pakistan is an agrarian country where agriculture serves as the backbone of the economy, providing livelihoods, contributing significantly to the Gross Domestic Product (GDP), and forming a major portion of the country's exports.[22] Reports from the NDMA indicate that climate-induced disasters could have severe repercussions for Pakistan's agriculture sector. Projections suggest that agricultural output could decline by 8-10 percent by 2040 due to rising temperatures and shifting rainfall patterns, which are likely to result in crop failures and reduced yields.[23] Each year, climate change continues to cause significant damage to crops, thereby adversely affecting the livelihoods of millions of people dependent on agriculture. The increasing climate vulnerability, exacerbated by frequent flooding, has become a major source of anxiety for those involved in agriculture, as it creates an uncertain and unpredictable future for their livelihoods.[24]

Countries," *World Economic Forum,* December 1, 2023. https://www.weforum.org/agenda/2023/12/cop28-loss-and-damage-fund-climate-change/.

20. Relief Web, "NDMA Monsoon 2024 Daily Situation Report No. 50 (19 August 2024)," August 20, 2024. https://reliefweb.int/report/pakistan/ndma-monsoon-2024-daily-situation-report-no-50-19-august-2024

21. British Red Cross, "Flooding in Pakistan: the latest news," https://www.redcross.org.uk/stories/disasters-and-emergencies/world/climate-change-and-pakistan-flooding-affecting-millions

22. Anam Azam and Muhammad Shafique, "Agriculture in Pakistan and its Impact on Economy——A Review," *International Journal of Advanced Science and Technology*, 2017. https://article.nadiapub.com/IJAST/vol103/5.pdf

23. Shakeel Ahmad Ramay, "Climate Change Killing Agriculture," *The Express Tribune*, June 6, 2022. https://tribune.com.pk/story/2360219/climate-change-killing-agriculture

24. Maha Akbar, "Over a Year After Pakistan Floods, Survivors Battle Climate Anxiety," *Al Jazeera*, October 24, 2023. https://www.aljazeera.com/gallery/2023/10/24/photos-over-a-year-after-pakistan-floods-survivors-battle-climate-anxiety

For NDMA, the 2023 floods resulted in the displacement of 162,257 people and the submergence of 153,231 acres of land with standing crops.[25] Additionally, the loss of 448 livestock further contributed to the hardships faced by this vulnerable community.[26] The table below provides a detailed summary of the damages to infrastructure, houses, and livestock.

Province / Region	Roads(Kms)	Bridges	House Damage			Livestock
			Partial	Full	Total	
Balochistan	43	7	303	125	**428**	131
Khyber Pakhtunkhwa	0	6	561	212	**773**	139
Punjab	0	0	148	100	**248**	44
Sindh	0	0	634	242	**876**	41
Gilgit Baltistan	1.5	14	105	64	**169**	80
Azad Jammu & Kashmir	0.233	4	56	25	**81**	3
Islamabad Capital Territory	0	0	0	0	**0**	10
Total	**44.733**	**31**	**1807**	**768**	**2575**	**448**

Figure. 1: Cumulative Damages from floods – 1st July to 19th August 2024
Source: NDMA - Monsoon 2024 Daily Situation Report No. 50[27]

Between July 1 and August 19, 2024, floods caused significant damages across various regions of Pakistan, as reported by NDMA. Balochistan faced the highest damage to roads (43 km) and bridges (7), while Khyber Pakhtunkhwa recorded the most affected houses, with 773 either partially or fully damaged. Sindh experienced the highest number of fully damaged houses (242), totaling 876 affected homes. Gilgit-Baltistan saw 14 bridges damaged, the most in any region, along with 169 affected houses. Livestock losses were highest in Balochistan (131), followed by Khyber Pakhtunkhwa (139). Minimal damage was reported in Punjab, Azad Jammu & Kashmir, and Islamabad Capital Territory, with the latter recording no damage to roads, bridges, or houses but a loss of 10 livestock. In total, 44.733 km of roads, 31 bridges, 2,575 houses, and 448 livestock were impacted across the

25. Relief Web, "Pakistan: Floods - Jun 2023," April 8, 2024. https://reliefweb.int/disaster/fl-2023-000119-pak.
26. Relief Web, "NDMA Monsoon 2024 Daily Situation Report No. 50 (19 August 2024)," August 20, 2024. https://reliefweb.int/report/pakistan/ndma-monsoon-2024-daily-situation-report-no-50-19-august-2024
27. NDMA Monsoon 2024 Daily Situation Report No. 50 (19 August 2024)."

country. To mitigate the devastating effects of climate change, Pakistan must focus on enhancing community preparedness through the adoption of advanced technologies that enable better forecasting and the development of effective adaptation strategies. These measures can help reduce the impacts of such disasters and safeguard the livelihoods of vulnerable populations.

The Role of Artificial Intelligence in Combating Climate Change

Emerging technologies have opened new opportunities to simplify life and advance solutions for modern challenges. Around the world, various countries are leveraging these technologies to mitigate and adapt to the climate crisis. Technologies such as AI, the Internet of Things (IoT), 5G, digital twins, robotics, Space 2.0 technologies, and Big Data are being applied to address the pressing challenges posed by climate change.[28] Among these, AI stands out as the most notable and impactful technology, as it is being extensively used to mitigate the adverse effects of climate change. AI is helping to develop better adaptation strategies by improving climate modeling, optimizing resource management, and enabling precision agriculture, making it a vital tool in combating the global climate crisis.

AI is still in its developmental phase, with ongoing advancements in various domains, particularly in climate adaptation. However, being at a nascent stage, many developing countries lack access to advanced mechanisms of assistive AI, while developed countries have made significant progress in this field. For developing countries, incorporating assistive AI is particularly crucial due to the more pronounced and visible impacts of climate change they face. These countries often have fewer resources and less adaptable strategies to cope with climate-related challenges. Recognizing this disparity, the UN is now actively working on initiatives to incorporate AI technology into climate action efforts in developing countries. The UN, under the UNFCCC, has taken proactive steps to incorporate AI technology in efforts to mitigate climate change.[29]

28. ASEAN Climate Change and Energy Project (ACCEPT), "Yunnan, "Emerging Technologies to Respond to Climate Change," September 15, 2021. https://accept.aseanenergy.org/emerging-technologies-to-respond-to-climate-change/.
29. Unfccc.int, "Technology Mechanism Initiative on Artificial Intelligence for Climate Action," https://unfccc.int/ttclear/artificial_intelligence

At the 2010 COP-16, the Technology Mechanism of the UNFCCC was established to accelerate the development and deployment of climate-related technologies. This mechanism comprises two complementary bodies: the Technology Executive Committee (TEC) and the Climate Technology Centre and Network (CTCN).[30] The TEC focuses on policy analysis and provides recommendations to countries, while the CTCN supports countries in implementing climate technology projects. Recognizing the transformative potential of AI, a focused initiative on its integration into climate solutions was introduced at COP-28. This marked a pivotal moment, as the Technology Mechanism began emphasizing the use of AI to address climate change-related challenges, paving the way for innovative strategies to curb its impacts and enhance global climate resilience.

At COP-28, the transformative potential of AI in addressing climate change was a key focus. The Technology Executive Committee (TEC), in collaboration with the non-profit open-source AI community Enterprise Neurosystem, launched the "AI Innovation Grand Challenge."[31] This initiative convened global leaders to discuss how AI could be harnessed to drive transformative climate action, particularly in developing countries. In 2023, the UN further reinforced its commitment by introducing the "AI4ClimateAction" initiative. This project explores the application of AI in climate change mitigation and adaptation, with a strong emphasis on developing countries. The aim is to enhance climate resilience and facilitate low-emission development pathways.[32] The AI4ClimateAction initiative specifically focuses on providing AI-driven solutions for climate adaptation in critical sectors such as agriculture and renewable energy.

Developed countries including, the US, Japan, China, and many other countries are already using AI technology to mitigate climate crisis. These countries can also help developing countries like Pakistan in the field of AI technology so that they can adapt to the changes by climate change and learn from the technologically advanced countries to incorporate AI in their climate security policies.

30. "Technology Mechanism Initiative on Artificial Intelligence for Climate Action."
31. Ians, "Innovation Challenge to Develop AI-powered Solutions for Climate Action," *The Statesman*, December 10, 2023. https://www.thestatesman.com/world/innovation-challenge-to-develop-ai-powered-solutions-for-climate-action-1503248453.html.
32. "Innovation Challenge to Develop AI-powered Solutions for Climate Action."

Lessons from the United States

The US is actively employing AI technology to address climate change. A notable example is the collaboration between International Business Machines Corporation (IBM) and NASA to develop an AI-based model, watsonx.ai. This advanced tool is designed to process satellite data and convert it into high-resolution flood maps.[33] Through flood mapping, the watsonx.ai model aids authorities in protecting lives and property by identifying high-risk areas, enabling targeted interventions, and steering future development toward safer regions. This demonstrates how major US industries are actively working to adapt to the challenges posed by climate change. In addition to flood mapping, the US has developed AI models specifically aimed at addressing climate change-induced disasters. One such model, referred to as "Coastal AI," uses artificial intelligence to simulate the effects of sea-level rise on coastal infrastructure across the US.[34] The Coastal AI model employs advanced AI algorithms to predict how various types of infrastructure, including roads, bridges, and buildings, will be impacted by rising sea levels. By analyzing data on sea-level rise, land use, and infrastructure vulnerability, the model provides detailed projections of potential damage and risk areas.

Lessons from China

China has also prioritized AI technology in its efforts to combat climate change. As the world's largest greenhouse gas emitter, China made a significant pledge at COP-26 to achieve net-zero emissions by 2060. To support this ambitious goal, China is leveraging AI technology alongside its broader strategic initiatives. Under its "China 2025 Strategy," the country aims to position itself as a global leader in AI technology.[35]

33. Sriram Raghavan and Christina Shim, "Earth's Climate Is Changing. IBM's New Geospatial Foundation Model Could Help Track and Adapt to a New Landscape," *IBM Research Blog*, July 5, 2023. https://research.ibm.com/blog/geospatial-models-nasa-ai.

34. Harshita Jain and Renu Dhupper. "Ai-Enabled Strategies for Climate Change Adaptation: Protecting Communities, Infrastructure, and Businesses from the Impacts of Climate Change," *Computational Urban Science.* https://www.researchgate.net/publication/372458556_AI-enabled_strategies_for_climate_change_adaptation_protecting_communities_infrastructure_and_businesses_from_the_impacts_of_climate_change

35. China AI Strategy, "A New Generation Artificial Intelligence Development Plan (2017)," https://datagovhub.elliott.gwu.edu/chinaaistrategy/#:~:text=Step2%3A%20By%202025%2C%20China%20should,AI%20security%20assessments%20in%20place.

A key component of this strategy is the development of a "green technological innovation system," which integrates AI to enhance environmental protection, reduce emissions, and support sustainable development."[36] China's plan to combat environmental hazards through technology involves the strategic deployment of advanced tools like AI to address ecological challenges. As part of this effort, the Chinese government has introduced guidelines encouraging industries to collaborate with major tech companies to work toward carbon reduction and environmental sustainability. One notable initiative comes from the Chinese tech giant Alibaba, which launched the "Ali Cloud Environmental Protection" program. This initiative leverages Alibaba's cloud computing and AI capabilities to monitor environmental conditions, optimize resource usage, and reduce carbon footprints.[37] The aim is to achieve energy efficiency and carbon neutrality by leveraging AI technology. Beyond energy and carbon management, China is also utilizing AI technology in weather forecasting systems.

Chinese scientists have developed an advanced AI model known as FuXi-Subseasonal, designed to improve the accuracy and duration of extreme weather predictions. This model utilizes sophisticated algorithms and large-scale meteorological data to deliver higher precision and longer-term forecasts for extreme weather events.[38] This model has been instrumental in providing early predictions of weather disasters, allowing for timely preparation and response. When deployed in Yunnan Province, China, which experienced flash floods, the model demonstrated its capability to forecast such events well in advance.[39] However, with the use of AI, assessing the flash flood risk in Yunnan Province based on historical records and generating early warnings became easier. Similarly, Fengwu Meteorological, another AI model used in China's weather forecasting system, has been employed to predict and generate early warnings for incoming typhoons such as Talim, Doksuri, and Khanun.[40]

36. "A New Generation Artificial Intelligence Development Plan (2017)."
37. "Alibaba to Provide Access to Powerful Environmental Monitoring AI," n.d., https://news.cgtn.com/news/346b6a4d33557a6333566d54/index.html
38. Zhao Yusha, "China's AI Weather Forecasting Model Front-runner Worldwide," *Global Time*s, https://www.globaltimes.cn/page/202401/1305205.shtml#:~:text=The%20model%2C%20%22FuXi%2DSubseasonal,longer%20forecasting%20period%20than%20existing.
39. Ming Ma and others, "Flash Flood Risk Analysis Based on Machine Learning Techniques in the Yunnan Province, China," January 17, 2019: 170, https://doi.org/10.3390/rs11020170
40. Yusha, "China's AI Weather Forecasting Model Front-runner Worldwide."

Lesson from Japan

In addition to China, Japan has also recognized the potential of early warning systems powered by AI technology. Japan has developed a highly coordinated AI-operated early warning system that integrates advanced technology, institutional frameworks, and community engagement across various levels and scales. Recently, Japan deployed the AI model Fugaku, one of the world's fastest supercomputers, to predict tsunamis in coastal areas before they reach those regions.[41]

This approach enables Japan to predict tsunamis and facilitate early evacuations from affected regions, minimizing potential loss of life and property. Additionally, a Japan-based meteorological service, Weathernews Inc., is actively working to enhance disaster preparedness by providing disaster-related information. The company collaborates with a popular messaging app to deliver real-time updates to customers, ensuring they remain informed and connected during emergencies. Furthermore, Japan has implemented an AI chatbot as part of a program supported by UNESCO.[42] This chatbot is designed to disseminate disaster-related information, answer questions, and assist communities in preparing for and responding to natural disasters.

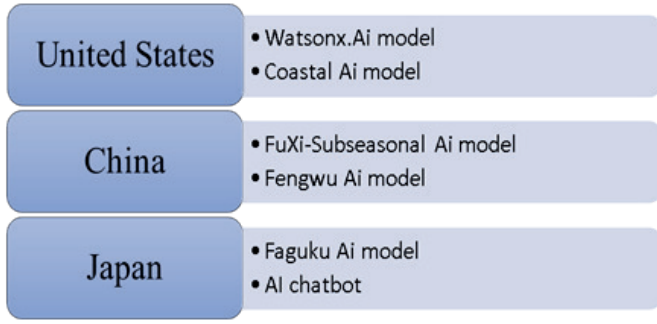

Figure 2: AI Models adopted by different countries

41. Springwise, "World's Fastest Supercomputer Used to Model Tsunamis," February 24, 2021, https://springwise.com/innovation/computing-tech/supercomputer-ai-tsunami-prediction/#:~:text=A%20Japanese%20supercomputer%20is%20being,that%20could%20predict%20tsunami%20flooding

42. Fatima Faisal. "Artificial Intelligence for Flood Prediction and Management: Lessons for Pakistan," *Institute of Strategic Studies Islamabad*, November 2, 2022. https://issi.org.pk/issue-brief-on-artificial-intelligence-for-flood-prediction-and-management-lessons-for-pakistan/.

Countries around the world are increasingly integrating AI technology into their climate adaptation strategies. From predicting extreme weather events to offering tools for building climate resilience, AI is providing an extensive range of innovative solutions. AI-powered models such as Google's Hydronet and Google Street View are being widely adopted globally for climate adaptation efforts.[43] Google Street View is frequently used to track disaster recovery, enabling authorities to assess damage and prioritize recovery efforts efficiently. Similarly, Google Hydronet is being utilized in countries like Bangladesh and India to identify flood-prone areas and predict the severity of flooding, helping these nations implement targeted mitigation strategies. Given Pakistan's heightened vulnerability to climate change, the country should incorporate AI technology into its climate adaptation framework.

Way forward for Pakistan

Pakistan is grappling with escalating challenges due to climate change, including water scarcity, extreme weather conditions, and poor agricultural conditions that contribute to food shortages. To address these pressing issues, Pakistan can leverage the potential of AI technology to develop effective solutions for climate-induced disasters. However, building AI-based climate adaptation strategies requires rapid resource mobilization, for which Pakistan can consider two key approaches. The first approach involves engaging with international platforms like the UN, which have already initiated programs to incorporate AI technology in addressing climate change.

Pakistan can collaborate with the UN to gain access to resources and expertise essential for accelerating the use of AI technology in climate adaptation. The UN, through initiatives like the Technology Mechanism under the UNFCCC, focuses on providing funding and support to developing countries for climate adaptation efforts. Pakistan can leverage these funds to enhance its capabilities in AI-driven solutions for addressing climate crises. The allocated funds can be strategically invested in strengthening and mobilizing the existing institutions working on AI development, such as research centers, academic institutions, and governmental bodies. Pakistan hosts several key institutions dedicated to

43. Faisal. "Artificial Intelligence for Flood Prediction and Management: Lessons for Pakistan."

advancing AI, including the Sino-Pak Centre for Artificial Intelligence (SPCAI) at the Pak-Austria Fachhochschule Institute of Applied Sciences and Technology, the National Centre for Artificial Intelligence (NCAI) at the National University of Sciences & Technology (NUST), and the Institute of Applied Sciences and Technology (PAF-IAST) in Haripur. These institutions are already collaborating with academia and industries in Austria and China to develop AI technology. Therefore, Pakistan can channel funds from the UN to these institutions to advance the application of AI technology for climate adaptation. Funding can be secured from sources such as the UN Loss and Damage Fund, the UN Development Program (UNDP), or the Adaptation Fund to support the development of AI models for climate adaptation. The second option for Pakistan is to adopt or incorporate existing AI models that are already in use by other countries. Pakistan can engage with these countries to deploy their developed AI models for climate adaptation. For example, Pakistan can establish partnerships with the US, Japan, and Chinese companies and industries to bring their established AI technologies into the country.

The AI models developed in the US can be seamlessly integrated into Pakistan's climate adaptation strategies. For instance, Pakistan can adopt the watsonx.ai model, developed by the US-based company IBM, for flood mapping. This model could be deployed in cities and towns across Pakistan that are frequently affected by floods. By utilizing satellite imagery of flood-affected areas in Punjab, Balochistan, or Sindh, the watsonx.ai model can analyze data to identify high-risk zones, assess the extent of flood damage, and generate detailed flood maps. Satellite images provided by government agencies or international organizations can be processed through the watsonx.ai algorithms to create these maps. This process would enable Pakistan to develop effective flood-risk management strategies promptly. The insights provided by these models could assist emergency responders and policymakers in acting swiftly, whether by constructing flood defenses or issuing early warnings to mitigate the impact of flood disasters. Moreover, the Coastal AI model used by the US can also be applied in the Indus Delta region in coastal Sindh, which is highly vulnerable to sea-level rise.[44]

44. Jennifer Weeks and others., "Sea-Level Rise in Pakistan: Recommendations for Strengthening Evidence-Based Coastal Decision-Making," *Hydrology* 10, no. 11 (October 25, 2023): 205. https://doi.org/10.3390/hydrology10110205.

Since the US employs this model in its coastal regions to protect vulnerable infrastructure, Pakistan can adopt a similar approach. This model can provide valuable information to analyze and predict the types of infrastructure that may be affected by specific sea-level rises. Furthermore, it can support the development of capacity-building measures to prevent potential damage to infrastructure, ensuring better preparedness and resilience against the impacts of climate change.

Pakistan needs to enhance its weather forecasting capabilities to issue early warning systems that can mitigate the impact of climate hazards, such as increased rainfall or extreme heat spells, which pose significant risks to agriculture and crop production. To achieve this, Pakistan can collaborate with Chinese meteorological companies to utilize advanced models like FuXi-Subseasonal, which are capable of predicting long-term weather patterns. This model uses data assimilation and integrates observations from various sources, including weather stations and satellites, into numerical modeling. This allows it to provide accurate weather forecasts for periods ranging from two weeks to a month. By leveraging such advanced forecasting tools, Pakistan can implement "climate-smart strategies" early, enabling farmers and policymakers to take preemptive measures to protect crops and reduce agricultural losses.[45]

In addition to other climate risks, Pakistan's coastlines face the imminent threat of tsunamis, which can originate from local sources and strike within minutes. A 2014 report highlighted that Karachi, one of Pakistan's most populous cities, could be entirely devastated by a tsunami.[46] To address this challenge, Pakistan can deploy the Chinese Fengwu meteorological model, which is highly effective in forecasting tsunamis and other extreme weather events. This model can provide early warnings, giving coastal communities critical time to evacuate and take safety measures. Given the importance of accurate weather forecasting for building climate adaptation strategies, Pakistan can also benefit from incorporating AI models from Japan. Japan has developed an advanced AI model for weather forecasting, known as

45. Mona Nagargade, Vishal Tyag, and Manoj Singh. Climate Smart Agriculture: An Option for Changing Climatic Situation. Plant Engineering, November 2017. https://www.researchgate.net/publication/321313268_Climate_Smart_Agriculture_An_Option_for_Changing_Climatic_Situation.

46. Afp, "Tsunami Could 'Wipe Out' Karachi," *Dawn*, September 10, 2014. https://www.dawn.com/news/1131095

Fugaku. By adopting such models, Pakistan can significantly enhance its efficiency in disaster response management. In addition to forecasting models, Pakistan can also utilize Japanese AI chatbots to coordinate emergency responses. These AI-powered virtual assistants can gather and analyze information from various sources, such as social media, sensors, and satellites. For instance, in disaster-hit areas, when affected communities share their needs, AI chatbots can engage with residents to provide information about the disaster and coordinate with emergency agencies. By facilitating real-time information exchange, these chatbots can streamline disaster response mechanisms, ensuring faster and more effective aid delivery.

Pakistan can pursue these options for the faster integration of AI technology to build climate resilience. Collaborating with the UN, other international organizations, or non-governmental organizations can help Pakistan secure funding to develop and deploy AI technology. Additionally, importing established AI models can significantly accelerate the integration of AI technology to address the climate crisis. However, Pakistan also faces several challenges in incorporating AI technology into its climate adaptation strategies.

Challenges in AI Integration for Climate Adaptation in Pakistan

Pakistan has the potential to incorporate AI technology into its climate adaptation strategies. However, the efficiency of AI depends heavily on critical infrastructure and human expertise, both of which pose significant challenges for Pakistan.[47] Developing and deploying AI technology in the country is hindered by several obstacles. One of the major challenges faced by Pakistan in integrating AI technology is the quality and quantity of data. AI models rely on large volumes of structured, labeled, and high-quality data to function effectively.

However, the limited availability of such data, combined with the prevalence of non-structured and non-labeled datasets, significantly hampers the efficiency and accuracy of AI models. Without access to reliable and well-organized data, AI systems may produce inaccurate predic-

47. Muhammad Hamza Amjad, "Artificial Intelligence (AI) and Policy in Developing Countries," PakistanInstitute of Development Economics (PIDE), 2023. https://file.pide.org.pk/uploads/wb-136-artificial-intelligence-ai-and-policy-in-developing-countries.pdf

-tions or fail to address climate-related challenges effectively.[48] Moreover, the inadequate representation of data reflecting diverse climate change perspectives or localized experiences can significantly affect the formulation and effectiveness of adaptation strategies. Without comprehensive and representative data, AI models may fail to capture the nuanced impacts of climate change in different regions, leading to suboptimal or misdirected strategies. Additionally, AI models rely on human expertise to deliver their maximum potential.[49] Skilled professionals are required to design, train, and interpret AI models effectively, as well as to apply their insights to real-world scenarios. The lack of trained personnel in fields such as data science, AI programming, and climate science further exacerbates the challenges in utilizing AI for climate adaptation. To address this, Pakistan must invest in capacity building and education programs to cultivate a workforce capable of leveraging AI technology effectively.

Pakistan also lacks the requisite infrastructure and facilities needed to produce a workforce skilled in emerging technologies, including artificial intelligence. This shortage of educational and training institutions focused on advanced technological skills hinders the country's ability to develop and deploy AI solutions effectively. Moreover, Pakistan's worsening economic conditions have been a significant impediment to the development and integration of new technologies. Limited financial resources restrict investments in essential infrastructure, research and development, and capacity-building programs.[50] The acquisition of funds from the UN or developed countries to build climate resilience poses another significant challenge for Pakistan due to endemic corruption. Major donors are often reluctant to provide financial aid to the governm-

48. Harshita Jain and Renu Dhupper. "Ai-Enabled Strategies for Climate Change Adaptation: Protecting Communities, Infrastructure, and Businesses from the Impacts of Climate Change," *Computational Urban Science.* https://www.researchgate.net/publication/372458556_AI-enabled_strategies_for_climate_change_adaptation_protecting_communities_infrastructure_and_businesses_from_the_impacts_of_climate_change

49. Muhammad Siddique Ali Pirzada, "Embracing AI in Pakistan's Public Sector Challenges Initiatives, and Future Prospects:", *South Asia Foresight Networ*k, 2024. https://southasiaforesight.org/embracing-ai-in-pakistans-public-sector-challenges-initiatives-and-future-prospects/

50. World Bank Group, "Sustained Reform Commitment is Needed to Overcome Pakistan's Economic Crisis," April 4, 2023. https://www.worldbank.org/en/news/press-release/2023/04/03/sustained-reform-commitment-is-needed-to-overcome-pakistan-s-economic-crisis#:~:text=ISLAMABAD%2C%20April%204%2C%202023%E2%80%94,the%20interbank%20and%20open%20rates

-ent, as allocated funds and resources are frequently misappropriated by influential individuals, preventing the aid from reaching the flood-affected and vulnerable communities who need it most. To overcome this credibility dilemma, Pakistan must make substantial efforts to improve its governance and reduce corruption. The poor governance structure in Pakistan significantly hampers the country's ability to implement efficient strategies to combat climate change. Beyond corruption, policy inconsistency poses a major challenge, as frequent changes or lack of continuity in policies undermine the effective implementation of climate adaptation measures.

Additionally, there is a lack of coordination among various departments responsible for climate change adaptation, resulting in duplicated efforts and inefficiencies in the formulation and execution of climate policies. This fragmentation prevents the development of cohesive strategies and wastes valuable resources. The Ministry of Climate Change and Environment Coordination in Pakistan has often been criticized for taking what many view as "cosmetic initiatives"—superficial measures that fail to address the root causes or provide substantive solutions. Its policymaking has been described as ineffective, lacking the necessary focus, depth, and action-oriented approach to drive meaningful climate adaptation and resilience.

The structural and financial challenges of integrating AI in Pakistan are substantial. However, beyond these hurdles, there is another critical aspect that must be considered before incorporating AI into climate change adaptation strategies: the "AI carbon footprint."[51] According to some forecasts, by 2040, the Information and Communications Technology (ICT) industry could be responsible for approximately 14% of global emissions.[52] AI technology requires substantial computational power, which consumes large amounts of energy and can significantly contribute to global emissions. According to a study, training a single AI model can generate over 626,000 pounds of CO2, an amount equivalent to the emissions produced by five cars over their entire lifetimes.[53]

51. Alokya Kanungo, "The Real Environmental Impact of AI | *Earth.Org,*" Earth.Org, March 5, 2024. https://earth.org/the-green-dilemma-can-ai-fulfil-its-potential-without-harming-the-environment/
52. Kanungo, "The Real Environmental Impact of AI | Earth.Org."
53. Karen Hao, "Training a Single AI Model Can Emit as Much Carbon as Five Cars in Their Lifetimes," *MIT Technology Review*, December 7, 2020.

Currently, as Pakistan works on establishing AI technology across various sectors, it would be prudent to prioritize the incorporation of "green AI technology" to minimize its adverse impact on the climate. Green AI technology emphasizes energy efficiency, sustainability, and reduced carbon emissions in the development and deployment of AI systems. This approach aligns with Pakistan's efforts to address climate change and would ensure that the adoption of AI technology supports rather than exacerbates environmental challenges. Some major tech companies are already leading the way in establishing green AI technology. For instance, Microsoft has committed to using 100 percent renewable energy by 2050, while Google has already achieved a milestone by powering its data centers entirely with renewable energy sources.[54] Given Pakistan's need for funds to support climate adaptation and the integration of AI technology, prioritizing green AI technology would be a strategic choice. By focusing on green AI, Pakistan can simultaneously combat climate change and attract funding from international organizations and climate-focused initiatives.

While AI technology offers promising opportunities for urgent climate adaptation in Pakistan, the challenges associated with its integration cannot be overlooked. Addressing these challenges is critical for ensuring the successful implementation of AI-driven solutions. To overcome these hurdles, Pakistan can collaborate with developed countries and international organizations to facilitate the effective development and deployment of AI technology.

Conclusion

Pakistan, with its diverse geography, is highly susceptible to climate-related vulnerabilities. The impact of climate change is becoming increasingly severe, manifesting in heatwaves, droughts, floods, and glacial lake outbursts. These climate-induced disasters have caused significant damage to the agriculture sector, infrastructure, and the livelihoods of millions across the country. Given the urgency to address these challenges, the integration of AI technology presents a pivotal opportunity for climate cha-

https://www.technologyreview.com/2019/06/06/239031/training-a-single-ai-model-can-emit-as-much-carbon-as-five-cars-in-their-lifetimes/

54. Lucas Joppa, "Made to Measure: Sustainability Commitment Progress and Updates", *The Official Microsoft Blog*, July 16, 2021. https://blogs.microsoft.com/blog/2021/07/14/made-to-measure-sustainability-commitment-progress-and-updates/

-nge adaptation. AI can provide advanced tools for disaster prediction, resource management, and resilience building, which are critical for mitigating the effects of climate change. However, as a developing country, Pakistan is still in the early stages of AI technology development. To maximize the potential of AI for climate adaptation, this research proposes ways through which Pakistan can incorporate AI technology for climate change adaptation.

Collaboration with the UN is a key option for Pakistan to secure financial support for establishing AI technology. The UN's recent initiative, AI4ClimateAction, focuses on climate change adaptation, making it a valuable opportunity for Pakistan to pursue. Pakistan needs to advocate a strong narrative highlighting the devastating effects of climate change on the country to gain support and take full advantage of the UN's actions for climate change. Additionally, Pakistan should develop effective policies to ensure that funds provided by the UN for climate adaptation are utilized in the right direction and achieve maximum impact. Another option for Pakistan is to import already established AI models from other countries, enabling the immediate implementation of proven technologies for climate adaptation without extensive development time.

The study examines certain AI models developed by the US, China, and Japan, which can be utilized in Pakistan for various climate adaptation purposes. For instance, US-developed models like watsonx.ai can aid Pakistan in flood risk management, while the Coastal AI model can identify vulnerable infrastructure affected by rising sea levels. Similarly, China's established models, such as the FuXi Subseasonal model and the Fengwu meteorological model, can help Pakistan improve long-term weather forecasting. By leveraging AI and generating early warning systems, the prediction of floods or extreme rainfall can become significantly more accurate. Japan's AI chatbots can assist in assessing disaster-related information in Pakistan and coordinating with emergency responders for immediate action. However, to fully avail the advantages of AI technology, Pakistan must address domestic obstacles, such as improving infrastructure, enhancing technical expertise, securing sustainable funding, and developing effective governance policies to ensure the efficient use of AI in climate adaptation. Integrating AI technology into Pakistan's climate adaptation strategy presents several challenges , including limited access to technology,

a lack of infrastructure facilities, and a shortage of skilled professionals. Additionally, poor governance and corruption are significant factors that undermine the trust of donor agencies. As one of the most vulnerable countries to climate change, Pakistan must prioritize this issue in its policy-making agenda. Public awareness about the severe impacts of climate change and its serious consequences on livelihoods is crucial for building a collective response to this pressing challenge. Civil society, particularly non-governmental organizations (NGOs), can play a pivotal role in supporting the government's efforts to combat climate change. These organizations can offer technical support and organize capacity-building programs for local communities and government agencies. Such programs can include training in disaster preparedness and climate-resilient infrastructure development.

By adopting these measures, Pakistan has the potential to build a more resilient future, enabling its people to better prepare for and mitigate the disastrous consequences of climate change. While AI is not a silver bullet, it can serve as a powerful tool for climate adaptation when used strategically and in conjunction with other approaches.

4

Impact Assessment of China-India Strategic Competition on Security Dynamics of South Asia

Impact Assessment of China-India Strategic Competition on Security Dynamics of South Asia

*Saira Rehman**

Abstract

The politics of South Asia predominantly revolves around two major players in the region: China and India. The emergence of China as a global power in the realm of geopolitics and geo-economics has directly impacted the power dynamics of South Asia. China and India have become competitive states, primarily due to the overarching interdependent linkages that integrate various world regions. This competition is further intensified by focused economic and regional connectivity projects, particularly under China's Belt and Road Initiative (BRI). China is influencing intraregional dynamics by expanding its political, financial, and security ties with smaller South Asian states. China's increased engagement in the region has provoked pushback from India, which has traditionally viewed South Asia as its natural sphere of influence. This intensifying competition between the two Asian powers has significant implications for South Asia's security and economic development, as their geostrategic interests increasingly overlap. Meanwhile, the smaller South Asian states are carefully maneuvering between these competing powers to maximize their political and financial benefits. This study examines the emerging trends in South Asia, driven by the strategic maneuvering of China and India, and the shifting regional dynamics impacting peace and stability in the region. The central question explored in this paper is how the smaller states of South Asia are navigating their national interests while being caught between the two regional giants i.e., China and India. The paper finds that despite China's economic rise and India's great power state status ambitions, South Asia is unlikely to engage in a theater of bloc politics.

Keywords: China, India, South Asia, Strategic Competition, Smaller South Asian States.

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Introduction

The dynamics of cooperation and competition between China and India are constantly changing, introducing new factors that are redefining regional relationships. Historically, smaller South Asian states have relied on India for support in political, economic, and security matters. This dependence originated from India's geographic centrality in South Asia, with its land and maritime borders connecting it to five neighboring countries in the region: Bhutan, Bangladesh, Nepal, Pakistan and Sri Lanka. Because of its geographical position and size, India viewed South Asia as its natural zone of influence and often asserted itself as a hegemon there. However, this trend has shifted in the past few years with the advent of China's expansive economic initiatives, most notably the transnational BRI.

In South Asia, India maintains distinct geographic, political, economic, and cultural linkages with its neighboring states. Significantly, India shares borders with the majority of South Asian countries, creating a strong dependence on India for intra-regional connectivity. At the same time, China serves as the other common neighbor for many South Asian countries. Except for Bangladesh and the island nations of Maldives and Sri Lanka, the remaining continental South Asian states share land borders with China. Strategically, South Asian countries are positioned between a growing India and a rising China—two regional powers with contrasting approaches to connectivity, peace, and security.

Across South Asia, China, now a global power, has emerged as a key player in reshaping the region's balance of power. Before emerging as a global economic powerhouse, China adopted a low-profile strategy in South Asia, maintaining diplomatic and political ties with most regional countries, except for Bhutan. During this period, Beijing concentrated on ensuring stability along its frontiers by formalizing boundary agreements and pursuing limited economic ties, while its extensive political as well as strategic partnership with Pakistan stood out as a significant exception. Over time, China's remarkable economic growth, regional trade expansion, and development have made it an indispensable player in South Asia. In this region, as in others, China is showcasing its growing influence by implementing a grand economic connectivity initiative, most notably thro-

-ugh the BRI. This initiative is reshaping regional dynamics and is set to have a profound influence on the patterns of peace and stability across South Asian region. Relations between China and India have grown increasingly strained over the last decade, particularly after a 2020 border clash between their troops in the Galwan Valley.[1] While there are serious concerns that the ties between these nuclear powers are deteriorating—particularly as both sides continue engaging in provocative actions—neither Beijing nor New Delhi appears willing to escalate the situation into a more serious conflict. However, the United States (US), as a superpower, has sought to counter China by deepening its security and economic relationship with India, declaring it an important player in the US Indo-Pacific strategy.

Meanwhile, the smaller South Asian states are strengthening their economic, political as well as security linkages with both China and India. As Beijing and New Delhi compete for access, influence, and networks across the region, the smaller South Asian states are demonstrating significant agency in carefully navigating this competition. Against the above backdrop, this paper seeks to assess the evolving nature of China-India engagement in South Asia and its impact on regional security dynamics. Specifically, it critically examines the engagement of China and India with smaller South Asian states and the responses of these nations to the two competing powers. Based on this analysis, the paper identifies key trends in the regional environment and their implications for peace and stability in South Asia.

The study draws primarily on official documents and statements from government officials of South Asian states and China. Additionally, it incorporates insights from emerging literature, including peer-reviewed academic works and reports published by think tanks in China and South Asian countries. In recent years, China's growing influence in South Asia has taken center stage in the emerging literature on South Asian security. However, less attention has been given to how smaller South Asian states are responding to the growing China-India rivalry and its impact on regional security dynamics. This study will contribute to the expanding bo-

1. "What was the India-China Military Clash in 2020 about?," *Reuters*, October 25, 2024. https://www.reuters.com/world/asia-pacific/what-was-india-china-military-clash-2020-about-2024-10-5/#:~:text=THE%20CONFRONTATION,India%20but%20controlled%20by%20China

-dy of literature on China's influence in South Asia.

China's Engagement with the South Asian States

South Asia has become increasingly important in China's foreign policy priorities. China's foreign policy strategies, including 'periphery diplomacy,' 'major-country diplomacy,' and 'South-South diplomacy,' directly and indirectly involve South Asia.[2] Similarly, South Asia has naturally aligned with China's external strategies pursued since the 2000s. For instance, the 'Go West'[3]strategy focused on developing China's western region, which borders South Asia. Later, the 'March West' initiative was introduced to counter Washington's strategic shift toward Asia, identifying South Asia as a natural avenue for China to enhance its presence. By pursuing these strategic initiatives, China has aimed to establish itself as a regional competitor to India, safeguarding its periphery while simultaneously counterbalance its key adversary, the US.

China is aware of India's expanding influence in South Asia, especially through its participation in US-led international security frameworks. Notably, China has avoided active military confrontations with its neighboring countries for nearly three decades. It has successfully resolved around 17 boundary disputes with neighboring countries, with the key exceptions being its disputes with India and Bhutan. In recent years, however, China and India have faced repeated standoffs along different sectors of their shared border.[4] The Doklam standoff in 2017 represented a major crisis, though it stopped short of military confrontation. In contrast, the Eastern Ladakh crisis of June 2020 escalated into violent clashes, as both armies engaged in conflict over border intrusions. and infrastructure development in the disputed areas.[5]

2. Jacob Stokes, "China's Periphery Diplomacy: Implications for Peace and Security in Asia," *Special Report, United States Institute of Peace (USIP)*, Washington D.C (2020). https://www.usip.org/publications/2020/05/chinas-periphery-diplomacy-implications-peace-and-security-asia

3. Jacky Zhu, ""Go West" and China's Inland Gateway Cities," *JLL Philippines*, June 26, 2020. https://www.jll.com.ph/en/trends-and-insights/research/go-west-and-china-inland-gateway-cities

4. Praveen Donthi, "India's Perilous Border Standoff with China: Modi's Tough Stance Could Invite, Not Deter-Chinese Aggression," *Foreign Affairs Journal* (2024). https://www.foreignaffairs.com/india/modi-perilous-border-standoff-china.

5. Shibani Mehta, "Impasse at the LAC: An Examination of the 2013, 2014, and 2015 Standoffs," *Carnegie Endowment.* (2023). https://carnegieendowment.org/research/2023/08/impasse-at-the-lac-an-examination-of-the-2013-2014-and-2015-standoffs/?lang=en

This confrontation has profoundly impacted China-India ties, intensifying regional competition in the short to mid-term. Beijing's primary objective is to maintain the status quo in the border regions while pursuing a resolution to the boundary dispute that serves its strategic interests. Simultaneously, Beijing remains engaged with New Delhi while expanding its political as well as economic influence through enhanced collaboration with smaller South Asian nations. The youthful population and vast economic growth potential of South Asia make it a compelling area of interest for China. China saw remarkable growth in trade and investment within the region, with its exports to South Asia soaring from $8 billion to $52 billion—a staggering increase of more than 500%.[6]

Over the past decade, China-India bilateral trade has maintained positive momentum despite ongoing geopolitical tensions. Reports indicate that the trade partnership between the two nations hit an all-time high of US$136.2 billion in 2023, marking a 1.5% rise compared to the previous year.[7] In South Asia, China has strengthened its economic relations with Pakistan by forming a free trade agreement, and is actively negotiating a similar arrangement with Sri Lanka.

Over time, China has forged new connections with South Asian states through trade, investment, and infrastructure initiatives, positioning itself as the principal force behind the BRI. South Asia has become an ideal starting point for these efforts due to its geographic proximity, large population, the developing nature of its smaller nations, their expanding economies, limited intra-regional connectivity, and immense potential for infrastructure development. These factors have made smaller South Asian states particularly receptive to China's infrastructure projects, including the development of ports, highways, and railway networks, under the framework of BRI. In 2013, on his first international visit as Chinese Premier, Li Keqiang prioritized South Asia to advocate for two significant economic corridors: the China-Pakistan Economic Corridor (CPEC)[8] and

6. Riya Sinha and Niara Sareen, "India's Limited Trade Connectivity with South Asia," Brookings Institution India Center, (May 2020), www.brookings.edu/wp-content/uploads/2020/05/Trade-Policy-Brief.pdf, p.4

7. Qian Zhou and Giulia Interesse, "China-India Economic Ties: Trade, Investment, and Opportunities," China Briefing, October 11, 2024. https://www.china-briefing.com/news/china-india-economic-ties-trade-investment-and-opportunities/

8. Shi Zhiqin and Lu Yang, 'The Benefits and Risks of the China-Pakistan Economic Corridor,' *CarnegieEndowment.* (2016). https://carnegieendowment.org/research/2016/12/the-benefits-and-risks-of-the-china-pakistan-economic-corridor?lang=en

the Bangladesh-China-India-Myanmar (BCIM) Corridor.[9] Since then, China has steadily enhanced its political as well as economic ties with South Asian nations under the framework of the BRI.[10] Additionally, in South Asia, the BRI includes sub-projects like the Trans-Himalayan Corridor, along with bilateral partnerships with Bangladesh, Sri Lanka, and the Maldives under the Twenty-first Century Maritime Silk Road framework.[11] China's expanding interests in the Indian Ocean region (IOR) are impacting coastal states, particularly those in South Asia. The IOR plays a pivotal role as a hub for Sea Lanes of Communication (SLOCs), facilitating the transport of essential imports and exports, particularly energy supplies. The Maritime Silk Road, a key initiative under the BRI, seeks to connect newly developed deep-sea ports with China through the Indian Ocean. In line with this vision, Chinese state-owned enterprises have made substantial investments in constructing and developing deep-sea ports such as Gwadar port in Pakistan and Hambantota port in Sri Lanka. Notably, however, India remains excluded from Chinese maritime strategy for the IOR.

India's Growing Influence in South Asia

India has historically regarded South Asia as its inherent zone of influence, a perspective that has shaped its efforts to assert significant regional dominance. It has extended its presence as well as influence beyond the smaller South Asian states, with the notable exception of its arch-rival, Pakistan, a middle power in the region. India has implemented this strategy through political engagement, defense collaborations, economic and trade partnerships, and the promotion of cultural ties. This strategy took a new turn after the BJP government, led by Narendra Modi, came into power in 2014, introducing the 'Neighborhood First' foreign policy to emphasize stronger relationships with India's regional neighbors.[12] The goal of India's 'Neighborhood First' policy was to enhance its influence across South Asia. To advance this objective, Prime Minister Modi extended invitations to South Asian leaders to attend his inauguration in May 2014. In the following two years, he paid official visits to all of India's South Asian neig-

9. Ashok Sajjanhar, "Understanding the BCIM Economic Corridor and India's Response," Issue Brief: Observer Research Foundation (ORF), (2016). https://www.orfonline.org/research/understanding-the-bcim-economic-corridor-and-indias-response.

10. Government Document; The State Council Information Office of the People's Republic of China, "What are six economic corridors under Belt and Road Initiative?," (2020). http://english.scio.gov.cn/beltandroad/2020-08/04/content_76345602.htm

11. "What are six economic corridors under Belt and Road Initiative?."

12. Document Ministry of External Affairs India. https://fsi.mea.gov.in/Images/CPV/LS97_00.pdf and Roy,

-hbors. During its first tenure, the BJP government emphasized gestures of engagement and cooperation with all neighboring states. To balance China, India has adopted dual strategies: (a) cooperating with China where feasible and (b) proposing alternative connectivity initiatives to obstruct China's increasing influence. The year 2014 saw India emerge as a founding member of the Asian Infrastructure Investment Bank (AIIB), initiated by China,[13] and became a member of the New Development Bank. Moreover, India became a full member of the Shanghai Cooperation Organization (SCO) in 2017, a China-led regional security forum.[14] Meanwhile, to leverage its expanding economic strength and strategic location, New Delhi introduced five major initiatives: the Neighborhood First policy (2014), the Act East policy (2014), Project Mausam (2014), Security and Growth for All in the Region (SAGAR-2015), and a collaboration with Japan on the Asia-Africa Growth Corridor (2017).[15]

The abrogation of Articles 370 and 35(a) and the revocation of the special status of Indian-Occupied Jammu and Kashmir by India is also a continuation of its policy of obstruction toward Pakistan and China, aimed at creating instability and imbalance in the region. Simultaneously, China's enhanced engagement with smaller South Asian states was regarded by India as a considerable threat to its regional influence. India remains wary of China's expanding political as well as economic engagement with smaller South Asian states, specifically in the context of the BRI and its flagship project, the CPEC.[16] India neither endorsed nor supported the CPEC, opting to withhold its backing. In response, Chinese leadership attempted to reaffirm India, emphasizing that CPEC was solely a developmental init-

Pradipta. "Decoding India's Neighborhood First' Policy," *The Indian Journal of Political Science* 76, no. 4 (2015): 1024–29. https://www.jstor.org/stable/26575650.

13. Press Release: India signs Articles of Agreement for Establishment of Asian Infrastructure Investment Bank (AIIB). Embassy of India in Beijing-China. https://www.eoibeijing.gov.in/eoibejing_listview/NjY4

14. Government Document, "The Shanghai Cooperation Organization (SCO) And India," Reference Note;No.28/RN/Ref./July/2017.
https://loksabhadocs.nic.in/Refinput/New_Reference_Notes/English/The_Shanghai_Cooperation_Organization.pdf

15. Sanjay Pulipaka Antara Ghosal Singh Saranya Sircar, "India and Connectivity Frameworks," Delhi Policy Group. (November 2017). https://www.delhipolicygroup.org/uploads_dpg/publication_file/india-and-connectivity-frameworks-1074.pdf.

16. Kai Neagle, "Why Is China's Belt and Road Initiative Being Questioned by Japan and India?," *E-International Relations (blog)*, May 2, 2020. https://www.e-ir.info/2020/05/02/why-is-chinas-belt-and-road-initiative-being-questioned-by-japan-and-india/.

-iative. Premier Li Keqiang described its purpose as an effort to "wean the populace from fundamentalism."[17] However, India viewed these developments through a different lens. As the CPEC route runs through the Gilgit-Baltistan region, a Pakistan-administered part of Kashmir, New Delhi remains highly cautious of China's presence in Kashmir. During a China-India strategic dialogue meeting, S. Jaishankar, Indian Foreign Secretary, explicitly stated, "The fact [is] that the China-Pakistan Economic Corridor... violates Indian sovereignty because it runs through Pakistan-occupied Kashmir (PoK)... the issue for us is a sovereignty issue."[18] In 2017, building on its concerns, India refrained from taking part in the high-profile Belt and Road Forum (BRF),[19] despite receiving an invitation from China to attend the summit. Significantly, a day before the BRF meeting, India publicly outlined its core objections to the BRI, including issues of territorial integrity and the "unsustainable debt burden" associated with BRI projects. New Delhi asserted that it could not participate in the BRI because it disregarded India's sovereignty; the Indian view was that "connectivity projects must be pursued in a manner that respects sovereignty and territorial integrity."[20]

In 2019, India once again chose to stay away from the BRF meeting.[21] New Delhi argued that Beijing had failed to consult or take it into confidence before planning the BRI, particularly regarding its enhanced engagement across South Asia. For New Delhi, Beijing's increasing economic as well as security footprints in the region through BRI projects was perceived as undermining India's longstanding presence in South Asia. This development, in New Delhi's view, has further complicated the balance of power in South Asia.

17. Shishir Gupta, "Govt Makes It Clear: India Has Not Forgotten Pakistan-Occupied Kashmir," Hindustan Times, May 24, 2015. https://www.hindustantimes.com/india/govt-makes-it-clear-india-has-not-forgotten-pakistan-occupied-kashmir/story-uYgfYuruxj4eYBfpGV0H7L.html.
18. K.J.M. Varma, "CPEC Violates Sovereignty: India Tells China," *Press Trust of India*, February 22, 2017. https://www.ptinews.com/news/8435073_CPEC-violates-sovereignty .
19. "India skips China's Silk Road Summit, Warns of 'Unsustainable' Debt," *Dawn*, May 14, 2017. https://www.dawn.com/news/1333087
20. 'Official Spokesperson's Response to a Query on Participation of India in OBOR/BRI Forum,' *Ministry of External Affairs*, May 13, 2017.
21. Bansari Kamdar, "What to Make of India's Absence from the Second Belt and Road Forum?" *The Diplomat (2019).* https://thediplomat.com/2019/05/what-to-make-of-indias-absence-from-the-second-belt-and-road-forum/.

Regional States' Balancing China and India

The China-India geo-economic and geo-strategic competition in South Asia revolves around two distinct categories of states. The first and most prominent is Pakistan, a South Asian middle power and a strategic partner of China. The second category includes smaller states including Bangladesh, Maldives, Nepal, and Sri Lanka. Bhutan, however, is excluded from this competition as China lacks diplomatic ties with the country, while India maintains a disproportionately strong political and economic relationship with Bhutan, effectively keeping it out of the strategic rivalry. The section below discusses the above states' balancing towards China and India.

Pakistan

Given the Pakistan-India enduring rivalry, bilateral economic and trade linkages remain minimal, while diplomatic relations are shaped by divergent political and security interests. This dynamic has led Islamabad and New Delhi to prioritize competition over cooperation in a zero-sum manner. This rivalry is particularly evident in India's perception of the CPEC, a joint venture between Pakistan and China. In April 2015, the leadership of China and Pakistan announced plans to significantly enhance Chinese investments in Pakistan's energy and infrastructure sectors. These plans also included the eventual establishment of Special Economic Zones (SEZs) to promote industrial manufacturing in Pakistan.[22] The CPEC includes an overland connectivity route beginning from Kashgar in Xinjiang region of China and ending at Gwadar in Pakistan's province of Balochistan. India immediately raised objections to this route, stating sovereignty concerns, as it runs through Pakistan-administered Kashmir which is a region India claims as its own. This development effectively reignited the historical territorial dispute between Pakistan and India over Kashmir, which had been relatively dormant for decades. Despite India's protests, Pakistan and China moved forward with limited scale cross-border projects. Notable developments include laying of a new fiber-optic cable connecting the two countries and the upgrading of the Karakoram Highway, which links them.[23]

22. Mustafa Hyder Sayed, "The China–Pakistan Economic Corridor: A Case Study," *IDS Bulletin* 50, no. 4 (2019): 4. https://bulletin.ids.ac.uk/index.php/idsbo/article/view/3066/3047.
23. Khaleeq Kiani, "CDWP Clears Rs567bn Karakoram Road Project," *Dawn*, May 31, 2024. https://www.dawn.com/news/1836760

Chinese investments under CPEC have played a significant role in alleviating Pakistan's persistent energy crisis by constructing transmission infrastructure and new power plants. By 2019, more than 6,000 MW of electricity from China-financed national grid.[24] Alongside, Pakistan's road infrastructure saw an upgradation with a mix of concessional loans and domestic financing supported by China. The key objective is to not only increase north-south connectivity but to also shorten travel times for both passenger and cargo transport.[25] Recently, the Chinese Prime Minister paid an official visit to Pakistan at the 25th SCO Summit, reaffirming the significance of economic cooperation and consolidation between China and Pakistan despite ongoing security challenges. While the 2007 free trade agreement (FTA) between the two countries marked a significant step forward,[26] Pakistan still needs to develop a robust trade policy vis-à-vis China to maximize benefits. Such a policy could help strengthen Pakistan's indigenous industries and diversify its exports. Currently, bilateral trade is on a positive trajectory, with a trade balance of $1.45 billion,[27] reflecting not only economic progress but also the deepening of strategic cooperation between China and Pakistan.

Bangladesh

Dhaka has been engaged in a cautious balancing act between China and India, the two regional heavyweights. Bangladesh has expressed interest in participating in both China's BRI and the India-Japan connectivity projects aimed at linking Southeast Asia with Northeast India. In October 2016, Bangladesh signed nearly 34 agreements with China to attract investment and bilateral assistance amounting to USD 24.5 billion.[28]

24. Muhammad Faisal, "China's Belt and Road Initiative in South Asia: An Assessment and Outlook," *Mac Donald Laurier Institute*, macdonaldlaurier.ca/files/pdf/20210518_China_BRI_in_South_Asia_Faisal_COMMENTARY_F Web.pdf

25. Rasheed, H. Kanwal, K., and Abbas, N. CPEC and the Challenges for the Energy Sector of Pakistan. *Bulletin of Business and Economics*,11(1), 222-227. (2022). https://doi.org/10.5281/zenodo.7327008

26. "Joint Statement between the Islamic Republic of Pakistan and the People's Republic of China," *Ministry of Foreign Affairs, Government of Pakistan.* https://mofa.gov.pk/press-releases/joint-statement-between-the-islamic-republic-of-pakistan-and-the-peoples-republic-of-china-2

27. Observatory of Economic Complexity (OEC), an Online platform of data visualization and distribution platform focused on the geography and dynamics of economic activities. https://oec.world/en/profile/bilateral-country/chn/partner/pak

28. "Bangladesh, China Firms Ink $13.6 Billion Deals as Xi Ends Tour," *Business Recorder*,

This was in addition to an ongoing joint venture with Beijing valued at over USD 13.5 billion. Earlier, however, New Delhi had pledged a credit line of up to USD 2 billion for socio-economic development projects across Bangladesh.[29] While Chinese assistance and investments are larger in scale and cover broader sectoral cooperation, Bangladesh has made it clear that it intends to avoid aligning with any geopolitical bloc, opting instead to "maintain good relations with everyone."[30] To demonstrate this policy of neutrality, Bangladesh joined the Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC) in 2017.[31] This sub-regional group, formed by India, serves as a parallel to the South Asian Association for Regional Cooperation (SAARC).

In June 2020, Dhaka sought financial support of up to USD 6.4 billion from Beijing for projects spanning railways, roads, ports, power, and telecommunications in order to enhance its economic prospects.[32] Earlier, China had focused primarily on infrastructure development in Bangladesh, including financing and constructing the 160 km-long Sitakunda-Cox's Bazar Expressway.[33] While this was one of the proposed port projects under the BCIM Economic Corridor, Dhaka has had to adopt a careful balancing strategy between China and India. Initially, Bangladesh showed interest in developing a new port at Sonadia. However, concerns over the terms of Chinese credit, coupled with geopolitical tensions and Indian protests, led to the project being abandoned. Bangladesh pursued two new port projects: Matarbari in Cox's Bazar, financed by Japan, and Payra, supported by nearly USD 600 million in Chinese investments.[34]

October 16, 2016. https://www.brecorder.com/news/4443621/bangladesh-china-firms-ink-136-billion-deals-as-xi-ends-tour-2016101693858

29. Syful Islam, "Has Bangladesh Lost Its Footing in the China-India Balancing Act?" *The Diplomat* (2024).https://thediplomat.com/2024/07/has-bangladesh-lost-its-footing-in-the-china-india-balancing-act/

30. Mohammad Hosain, "How huge China investment in Bangladesh affects region," *Anadolu Agency,* November 10, 2016. http://aa.com.tr/en/analysis-news/opinion-how-huge-china-investment-in-bangladesh-affects-region/683065

31. "Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC)," Asia Regional Integration Center. https://aric.adb.org/initiative/bay-of-bengal-initiative-for-multi-sectoral-technical-and-economic-cooperation

32. Mir Mostafizur Rahaman, "BD Seeks $6.4b Chinese Fund for New Projects," *The Financial Express,* June 29, 2020. https://thefinancialexpress.com.bd/economy/bd-seeks-64b-chinese-fund-for-new-projects-1593400758.

33. Asif Showkat Kallol, "Sitakunda-Cox's Bazar Marine Drive to be Linked with Asian Highway," *Dhaka Tribune*, September 22, 2016. https://www.dhakatribune.com/business/5708/sitakunda-cox%E2%80%99s-bazar-marine-drive-to-be-linked

34. "Payra Deep Sea Port (Construction)," *Reconnecting Asia*, March 2021.

Meanwhile, China's perceived reluctance to proceed with some of Dhaka's loan requests has been attributed by experts and political analysts to Prime Minister Sheikh Hasina's strong alignment with India. Before she visited China, Hasina traveled to India, where she signed several bilateral cooperation agreements, including the establishment of a train route connecting Bangladesh and India. Furthermore, Bangladesh's decision to collaborate with India on the Teesta River Comprehensive Management and Restoration Project has been perceived as undermining China's regional interests.[35]

The recent political transition in Bangladesh, characterized by the ousting of Sheikh Hasina's government, has introduced a significant shift in the geopolitical landscape of South Asia. This change has weakened India's longstanding influence in Bangladesh, which was fostered during Sheikh Hasina's tenure through close bilateral cooperation and strategic alignment. In the ensuing strategic vacuum, China has actively sought to expand its influence in Bangladesh by leveraging economic, political, and strategic initiatives.

Maldives

Despite being a small island nation, the Maldives has attracted significant attention from both China and India. In response, Malé has carefully maintained a degree of neutrality on security issues while securing substantial financial investments from both sides. China considers the Maldives a "natural node" in its Maritime Silk Road initiative, owing to its strategic position in the IOR, which provides equal access to all regional countries.[36] In September 2014, Xi Jinping visited Maldives after which China-Maldives relations saw significant progress.[37] In its aftermath, Chinese companies and banks actively financed and built several critical projects

https://reconnectingasia.csis.org/database/projects/payra-deep-sea-port-construction/29017d80-6361-42de-80b8-a279982dc4fc/.

35. "Has Bangladesh Lost Its Footing in the China-India Balancing Act?"

36. Wang Fu Wang Fukang, "China and Maldives: Partners in Building 21st Century Maritime Silk Road Together," *Embassy of the People's Republic of China in the Republic of Maldives*, January 16, 2015. http://mv.chineseembassy.org/eng/mytz/t1228934.html.

37. Joint Press Communique between the People's Republic of China and the Republic of Maldives. https://www.mfa.gov.cn/eng/zy/gb/202405/t20240531_11367357.html

in the Maldives. These include the expansion of Malé International Airport, the 18-km-long Laamu Atoll Link Road,[38] and a 1.4-km-long cross-sea bridge connecting the airport island with Malé. Additionally, Beijing has proposed constructing a new port in the Maldives, further deepening its economic engagement with the island nation.

India has maintained a naval presence in the Maldives for years to retain influence and conduct joint patrols within the island nation's exclusive economic zones.[39] However, in 2018, the Maldives signaled its discomfort by pressing India to scale back its naval presence, even as it assured New Delhi that it would not allow China to develop military facilities on its territory.[40] In December 2017, the Maldives concluded a Free Trade Agreement (FTA) with China,[41] a move New Delhi perceived as giving Beijing a significant economic edge in the region. To assuage Indian concerns, Maldivian leaders reassured India that their country would not grant security concessions to China.[42] Nevertheless, India pushed back, and in the 2018 presidential elections, strongman Muhammad Yameen, perceived as pro-China, lost the presidency to Ibrahim Mohamed Solih. Under Solih's leadership, the Maldives sought to rebalance its foreign policy, prioritizing increased cooperation with Japan, India, and the European Union (EU).

The US responded to China's increasing influence in the Maldives by opening its embassy in Malé in October 2020.[43] However, the 2023 victory of Mohamed Muizzu brought a significant shift in the Maldives' foreign policy.

38. "The Chinese Ambassador to Maldives H.E. Mr. Wang Fukang and the President of Maldives H.E. Mr. Abdulla Yameen Abdul Gayoom Jointly Lay the Foundation of Laamu Atoll Link Road Project under Chinese Assistance," *Embassy of the People's Republic of China in the Republic of Maldives*, January 3, 2015. http://mv.chineseembassy.org/eng/mytz/t1225323.html
39. Sanjeev Miglani, "Maldives seeks scaling back of Indian presence as it woos China," *Reuters*, August 10, 2018. https://www.reuters.com/article/us-india-maldives-idUSKBN1KV13S
40. Miglani, "Maldives seeks scaling back of Indian presence as it woos China."
41. "Maldives Parliament Approves FTA With China – But With No Opposition Present," *The Wire*, November 30, 2017. https://thewire.in/diplomacy/maldives-parliament-approves-fta-china-amidst-opposition-boycott.
42. Ramachandran S, 'The China-Maldives connection', *The Diplomat*, January 25, 2018. https://thediplomat.com/2018/01/the-china-maldives-connection/
43. Nike Ching, "US to Open Embassy in Maldives Amid Geopolitics Competition with China," *Voice of America*, October 28, 2020. https://www.voanews.com/usa/us-open-embassy-maldives-amid-geopolitics-competition-china.

However, the 2023 victory of Mohamed Muizzu brought a significant shift in the Maldives' foreign policy. Relations with India became strained, and the island nation's diplomatic alignment began tilting decisively toward China. Under Muizzu's administration, the Maldives is pursuing closer ties with Beijing, marking a notable departure from Solih's balanced approach.

Nepal

In Nepal, China has steadily increased its economic and developmental support, especially as India scaled back its engagement with the country. For China, Nepal was strategically located as a land route to connect with the Indian economy. However, events took China's involvement in a different direction. In 2015, India-Nepal relations sharply deteriorated after India imposed an undeclared economic blockade due to Nepal's proposed constitutional changes and its expanding cooperation with China. In response, Beijing stepped in to fill the gap, opening new cross-border road and railway links to streamline the transportation of goods from China. Furthermore, China permitted Nepal to trade with third countries through its ports, effectively ending Nepal's exclusive reliance on India for overland trade. A particularly significant development was China's construction of cross-border fiber optic cables, which ended Nepal's reliance on Indian telecommunication networks.[44]

In return for China's economic support, Nepal joined the BRI and initiated a feasibility study for the construction of a railway. In return for China's economic support, Nepal joined the BRI and initiated a feasibility study for the construction of a railway line linking Tibet.[45] China has pledged over US$8 billion for infrastructure development, including the ambitious Kathmandu-Lhasa railway line.[46] In contrast, Indian bilateral assistance to Nepal stood at approximately US$315 million in 2015.[47]

44. Gopal Sharma, "With New Chinese Link, Nepal Ends India's Internet Monopoly," *Reuters,* January 12, 2018. https://www.reuters.com/article/us-nepal-china-internet-idUSKBN1F11JP.
45. "Xi's South Asia Trip Boosts Ties with India and Nepal, Promotes Regional Cooperation," *Xinhua*, October 14, 2019. http://www.xinhuanet.com/english/2019-10/14/c_138469068.htm.
46. Ramesh Bhushal, "Nepal and China take step towards one of 'world's toughest railways," *Dialogue Earth.* (2022). https://dialogue.earth/en/business/nepal-china-take-step-towards-one-of-worlds-toughest-railways/
47. Ministry of Foreign Affairs India, "India-Nepal Bilateral Relations Brief." (2024). https://www.mea.gov.in/Portal/ForeignRelation/Open-bilateral-brief-20-June-2024.pdf

Nepal also benefited from India's support in fuel supply and remittances during that period. However, with China's significant financial backing, India now faces challenges in employing economic coercion as it did in the past. In response to China's expanding influence in Nepal, India has sought to recalibrate its relationship with Kathmandu by promising increased economic assistance and enhancing leader-level visits. Despite China's enhanced presence, Nepal has avoided engaging in security cooperation with Beijing that might alarm India, signaling a deliberate and balanced approach to its foreign relations.

Sri Lanka

Sri Lanka has attracted renewed interest from both India and China in recent years. For China, Sri Lanka's strategic location in the IOR presents an opportunity to establish a cost-effective transit hub for shipping and logistics, as well as a foothold in the region. To this end, China has financed several major infrastructure projects, including the construction of the Hambantota Port (predating the launch of the BRI),[48] the Port City Project in Colombo, and the Colombo Airport Expressway. In July 2017, China acquired Hambantota Port on a 99-year lease, a move that drew strong pushback from India and Western governments.[49] In response to Indian concerns, Sri Lanka clarified that the port would be restricted to civilian use and that the docking of Chinese naval vessels would be prohibited.[50] Earlier, in May 2017, Colombo had already denied a request from Beijing to host a submarine at the port,[51] signaling to New Delhi that it remained mindful of Indian sensitivities.

Extensive Chinese investments in Hambantota Port, the airport, and various industrial projects have raised international concerns about Sri Lanka's ability to service its growing debt to China. have raised international concerns about Sri Lanka's ability to service its growing debt

48. "A Long Voyage to Success: China's Investment in Hambantota Port Faces Several Challenges," *Hellenic Shipping News Worldwide*, January 17, 2019. https://www.hellenicshippingnews.com/a-long-voyage-to-success-chinas-investment-in-hambantota-port-faces-several-challenges/.
49. Rabi Sankar Bosu, "Hambantota Port deal opens up a new era for China- Sri Lanka cooperation," *China Daily,* 2017. https://europe.chinadaily.com.cn/opinion/2017-08/10/content_30420421.htm
50. "Sri Lanka signs Hambantota port deal with China", *Al Jazeera*, July 29, 2017. https://www.aljazeera.com/news/2017/7/29/sri-lanka-signs-hambantota-port-deal-with-china
51. "China defends military ties with Sri Lanka after submarine visit blocked", *Reuters*, May 12, 2017. https://www.reuters.com/article/us-china-sri-lanka-defence-idUSKBN1881QM

have raised international concerns about Sri Lanka's ability to service its growing debt to China. In response to Colombo's mounting external debt, Beijing signaled its openness to renegotiate terms. One preferred option for China was a debt-for-equity swap, allowing Chinese firms to manage Hambantota Port on a long-term basis. This approach, however, triggered regional and international pushback. Despite the criticism, Sri Lanka opted to maintain its engagement with China, focusing on expanding economic and infrastructure development cooperation. High on Colombo's agenda was the early conclusion of a free trade agreement with Beijing.

Meanwhile, Colombo has actively incentivized New Delhi to increase its investments in connectivity and infrastructure projects within the island nation. Sri Lanka offered India the opportunity to take over and revive the Hambantota airport, a project abandoned by China. Additionally, India remains the largest supplier of railway coaches, trucks, and other transportation equipment to Sri Lanka.

Despite growing Chinese investments, India continues to be Sri Lanka's largest trading partner. In 2017, New Delhi pledged over US$2.5 billion for various development projects in Sri Lanka.[52] This ability of Sri Lanka to attract significant foreign investments from both China and India—while managing to avoid considerable opposition from either—stands out as a case study in strategic economic diplomacy.

The current regime, led by President Dissanayake, is grappling with immense challenges, including macroeconomic instability and pressure from the International Monetary Fund (IMF).[53] As a result, the government cannot afford to sideline either China or India, as both are essential to keeping the country's economy afloat. On the diplomatic front, Sri Lanka has adopted a policy of hedging, carefully balancing between China and India.

52. Thilina Panduwawala, "India's Extraordinary Support during Sri Lanka's Crisis: Motivations and Impacts," *Journal of Indo-Pacific Affairs.* (2024). https://www.airuniversity.af.edu/JIPA/Display/Article/3859529/indias-extraordinary-support-during-sri-lankas-crisis-motivations-and-impacts/

53. Andrew Fidel Fernando, "Real Winners of Sri Lanka's Election: A People Emboldened to Force Change," *Al Jazeera*, September 30, 2024. https://www.aljazeera.com/features/2024/9/30/real-winners-of-sri-lankas-election-a-people-emboldened-to-force-change

Impact on Regional Security Dynamics

The China-India competition, coupled with the strategic maneuvering by smaller South Asian countries, has direct implications for regional security dynamics. At the core of this competition is the uneasy bilateral relationship between Asia's two giants. Their unsettled boundary has been a recurring source of tensions and military stand-offs in recent years.[54] Despite these tensions, economic and trade relations between the two countries have grown significantly since the post-Cold War era. However, their divergent foreign policy goals and strategic outlooks have fueled competition for influence, connectivity, and security across South Asia. China's remarkable economic growth has been a driving force in this competition, positioning it as a major commercial partner for South Asian states, including India. As geopolitical competition between Beijing and New Delhi intensifies across the region, several emerging trends are becoming increasingly evident.

First, China and India have strived to maintain a delicate balance of managed competition in South Asia. However, the current trajectory of their relationship has the potential to escalate into outright rivalry. While both sides publicly advocate for a bilateral relationship based on mutual respect and managing differences through cooperation, the confrontational approach India has adopted following the Ladakh crisis has placed the China-India relationship at a critical crossroads.

Second, China has made notable progress in expanding its strategic influence in South Asia by strengthening ties with smaller states that traditionally maintained close relations with India due to geographic and cultural linkages. Beijing's growing engagement has primarily focused on economic and infrastructure development projects, rather than establishing a deeper political or security footprint.

Third, India faces resource constraints, including limited financial reserves and advanced technologies, which hinder its ability to serve as the primary provider of public goods in South Asia, especially when compared to China. This has created an opening for Beijing to step in and fill the gap in

54. Dr. Sidharth Raimedhi, A Report: "The Road to Galwan: Crisis at the Line of Actual Control & China's Motivations," Council for Strategic and Defense Research (CSDR).

public goods provision. Smaller South Asian states have recognized this dynamic and have increasingly focused on maximizing their economic gains by exercising greater agency in their dealings with India.

Fourth, China's rapid rise has created significant balancing opportunities for India's neighbors. This is largely due to the relative absence of an intense balance of power competition between India and China in South Asia. Instead, both Beijing and New Delhi have so far pursued soft-balancing strategies and diplomatic engagement. Consequently, India has remained focused on addressing the needs and concerns of smaller states, even as those states deepen their cooperation with China.

Fifth, India harbors concerns over the potential deepening of China's ties with smaller South Asian states in the political and security domains, particularly regarding the possibility of a Chinese naval presence at strategic ports. Such a development, especially in Sri Lanka or the Maldives, would escalate regional competition in South Asia. Furthermore, it could destabilize smaller states by complicating their ability to maintain balanced relations with both India and China, potentially undermining their capacity to attract economic support and investments from both powers.

These trends are bound to have significant implications for regional security and stability in South Asia. Among the South Asian countries, Pakistan stands out as a key strategic player in the balance of power between China and India. Given its close political, economic, and security ties with China, Islamabad has been able to counterbalance India while pursuing stability in the region. Even as India deepened its strategic cooperation with the US, Pakistan relied on China to address the resulting imbalance in South Asia. This dynamic has given rise to two informal dyads in the region: India-US and Pakistan-China.

Against this backdrop, China has actively endorsed Pakistan's role in maintaining a balance of power in the South Asian region, while Islamabad remains equally mindful of the trajectory of China-India relations. Beijing has consistently called on both Islamabad and New Delhi to improve their bilateral relationship, urging greater dialogue to reduce tensions. Meanwhile, for other smaller states in South Asia, their strategies of seeking enhanced economic benefits from both India and China come with limitat-

-ions. Unlike Pakistan, these states are unable to engage in active balancing behavior. Instead, their most viable course of action is to avoid entanglement in the security competition between China and India while focusing on securing greater economic assistance from both powers.

In terms of the regional order, it is evident that despite Beijing's growing presence in South Asia, smaller nations continue to regard New Delhi as the dominant player in the region. This perception limits China's ability to fully capitalize on its economic leverage to achieve greater political and security gains. While India has a long history of intervening in the domestic politics of smaller nations and influencing their foreign policies, China has largely refrained from deeper involvement in the internal affairs of other countries. However, this adherence to non-interference constrains China's ability to secure meaningful strategic advantages in the region.

At a limited scale, smaller South Asian countries will continue to navigate between India and China to maximize their economic gains and expand their political space. This maneuvering, however, must be carefully managed to avoid infringing on the core strategic interests of either Beijing or New Delhi. To achieve this balance, these countries will increasingly learn from one another's experiences, as they are at different stages of engagement with both China and India.

Conclusion

The China-India strategic competition has fundamentally reshaped the security dynamics of South Asia, with profound implications for economic development and regional stability. This paper has highlighted the growing contest between the two powers as they vie for influence across South Asia, focusing on their engagement with smaller states and the impact of this competition on regional order. While China has made significant inroads through economic investments, infrastructure projects, and trade initiatives —primarily under its BRI—India continues to leverage its geographic proximity, historical ties, and regional dominance to maintain its influence. Smaller South Asian states have emerged as critical players in this competition, exercising agency in balancing their relationships with Beijing and New Delhi to maximize economic and political benefits. These states have demonstrated strategic acumen by employing hedging and balancing

strategies, carefully navigating the dual pressures of maintaining sovereignty while securing external support for their development agendas. However, their positioning also underscores the challenges of avoiding deeper entanglement in the security dimensions of China-India competition, particularly as tensions between the two regional giants intensify.

Despite these challenges, South Asia is unlikely to devolve into a theater of bloc politics. The regional environment, characterized by soft-balancing strategies and overlapping economic interests, has allowed smaller states to maintain a degree of neutrality. Pakistan, as a middle power with close ties to China, remains an exception and a pivotal actor in the regional balance of power, further complicating India's strategic calculations.

Looking ahead, the trajectory of China-India relations will be instrumental in shaping the future of South Asia's security dynamics. The region's stability will depend on the ability of smaller states to maintain a delicate balance, avoiding alignment with one power at the expense of alienating the other. Meanwhile, the sustained economic engagement of both Beijing and New Delhi in the region offers opportunities for growth and connectivity but also risks exacerbating tensions if not managed prudently.

Ultimately, nurturing a stable and cooperative regional environment in South Asia requires all actors—China, India, and the smaller states—to prioritize dialogue, mutual respect, and the pursuit of shared economic and security goals. While the competition between China and India shows no signs of abating, the pragmatic engagement of smaller South Asian states provides hope for a balanced and peaceful regional order.

5

Pakistan's Cybersecurity Landscape: Information and Communication Technology Readiness, Challenges and Opportunities

Pakistan's Cybersecurity Landscape: Information and Communication Technology Readiness, Challenges and Opportunities

Zaheema Iqbal[*] *and Rafi us Shan*[*]

Abstract

There is a direct correlation between digital adoption and the prevalence of cyber threats; likewise, digital readiness and cybersecurity rankings are closely intertwined. Pakistan's Information and Communication Technology (ICT) posture is directly tied to its commitment to cybersecurity. With the increased use of the internet and the growing sophistication of cyber-attacks by both state and non-state actors, cybersecurity has become a significant challenge for policymakers in Pakistan in the commercial domains. This paper examines Pakistan's ICT index ranking, and patterns of cyber threats landscape. By assessing Pakistan's cybersecurity standing based on the Global Cybersecurity Index (GCI) published by the International Telecommunication Union (ITU), this paper provides actionable recommendations for national policymakers to address the gaps in the cybersecurity framework and improve national position in global cybersecurity rankings.

Keywords: Cyber threats, cybersecurity rankings, ICT, ITU, GCI, Pakistan's Cybersecurity Strategy.

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Introduction

Information systems are one of the fundamental pillars of knowledge-based economies.[1] Over the past decade, the nature and volume of information managed and delivered through ICT have grown exponentially. ICT-based systems are now a key enabler for service delivery in Pakistan, government departments and service providers have been actively designing and deploying various applications and services to deliver public services through ICT. However, despite these efforts, Pakistan's overall ICT ranking in various global indexes has not shown significant improvement.[2]

While government ministries and autonomous bodies at both federal and provincial levels are advancing the agenda of digital transformation, in return, the uneven growth of digital technologies has led to a widening digital divide. Additionally, the health and resilience of digital systems and processes have not been prioritized under any existing digital transformation policy. This lack of focus has contributed to a decline in the country's overall information security posture, posing risks to the progress of its digital transformation initiatives.[3] To ensure inclusive and sustainable digital transformation for all, consistent and well-structured efforts are essential.

This paper provides an overview of Pakistan's ICT posture, examining its alignment with various established ICT indexes and offering a detailed breakdown of the parameters and their coverage used in these indexes. There is a clear linkage between a country's ICT posture and its commitment to information security. The paper assesses Pakistan's current cybersecurity performance based on the Global Cybersecurity Index and offers actionable recommendations for national policymakers to improve its standing in ICT-related rankings in general and the GCI of the International Telecommunication Union in particular.

1. Shahrazad Hadad, "Knowledge Economy: Characteristics and Dimensions," *Management Dynamics in the Knowledge Economy* 5, no. 2 (2017): 203–225. https://www.researchgate.net/publication/318005213_Knowledge_Economy_Characteristics_and_Dimensions

2. Asif Javed, "The Scope of Information and Communication Technology Enabled Services in Promoting Pakistan Economy," *Asian Journal of Economics, Finance and Management*, no. 4 (2020): vol. 2, pp. 1–9.

3. Usama Nizamani, "Internet Governance and Pakistan's Digital Economy," *Journal of Current Affairs*, no. 2, vol. 3 (2019): 23–49.

Assessing National ICT Landscape

The digital landscape of Pakistan is analyzed through the lens of various indexes, examining current postures, identifying reasons for shortcomings, and providing recommendations. These indexes evaluate the progress of ICT development, the evolution of digital transformation across multiple factors, cross-sector and regional comparisons in the adoption of digital technologies, the extent of the digital divide, and overall ICT development. Additionally, they offer valuable insights into policy formulation and, most importantly, highlight the potential for ICT development within various affiliate sectors that influence ICT adoption. This section is divided into two sub-sections. The first sub-section analyzes Pakistan's performance in ICT indexes, while the second sub-section reviews the efforts made by Pakistan to strengthen and complement its digital ecosystem.

To achieve this, the study has examined benchmarked ICT-related indexes, focusing primarily on Pakistan's performance and potential in these frameworks, including the ICT Development Index (IDI), the E-Government Development Index (EGDI), the Network Readiness Index (NRI), and others. Additionally, the study provides an analytical review of Pakistan's performance in the Global Cybersecurity Index by the ITU, evaluated against the benchmarks set by these ICT indexes.

The following section assesses key indexes, highlighting Pakistan's commitment to various established digital frameworks, analyzing the impact of their sub-pillars, and exploring the country's potential within these sub-pillars.

Serial No	Index / Indicator	Ranking of Pakistan
1	The ICT Development Index 2023	48.7 / 100
2	E-Government Development Index (EGDI) 2024	136/193
3	The Network Readiness Index Report 2023	90/121
4	Global Cybersecurity Index 2024	94/194
5	Global Digital Readiness Index 2021	120/146

Table 1: List of Indexes and Pakistan's Ranking.
Source: Compiled by the authors (drawing data from the ICT Development Index 2023, E-Government Development Index 2024, The Network Readiness Index Report 2023, Global Cybersecurity Index 2024, and Global Digital Readiness Index 2021)

The ICT Development Index

The ICT Development Index (IDI) tracks progress toward an information society. As a composite index, it combines multiple indicators into a single benchmark and has been published annually by the ITU since 2009.[4] The 2023 IDI incorporates seven indicators and covers 169 economies. Its core objectives are to measure the level, evolution, and progress of ICT development, assess the digital divide, and evaluate how effectively countries can leverage ICT for growth based on their existing skills and capabilities. Pakistan ranks 48th on the index and possesses significant ICT potential. With a population exceeding 220 million, a median age of 22, and around 35% of its population under 15 years of age (and approximately 60% under 35 years of age), Pakistan has a young and dynamic demographic profile.[5] Empowering this youth bulge with appropriate digital skill sets, along with providing affordable access to digital platforms and communication technologies, could substantially improve Pakistan's standing in the ICT index.

E-Government Development Index (EGDI) 2024

The EGDI evaluates the use of ICT systems to deliver public services across countries. It is based on three main components: the Human Capital Index (HCI), the Online Service Index (OSI), and the Telecommunication Infrastructure Index (TII). The 2024 EGDI provides a comprehensive assessment of the digital landscape across 193 economies.[6] The overall index reflects significant progress, with the proportion of the population less engaged in digital development decreasing from 45.0% in 2022 to 22.4% in 2024.[7] Pakistan has made significant progress, rising to the 136th position in the 2024 EGDI by uplifting its status from the 151st rank in the 2022 survey. This marks Pakistan's first-ever entry into the "High EGDI"

4. "Measuring Digital Development – ICT Development Index 2024," *International Telecommunication Union* (ITU), June 2024. https://www.itu.int/hub/publication/D-IND-ICT_MDD-2024-3/
5. "Measuring Digital Development – ICT Development Index 2024."
6. "UN E-Government Survey 2024: Accelerating Digital Transformation for Sustainable Development," *United Nations*, 2024. https://desapublications.un.org/publications/un-e-government-survey-2024
7. "UN E-Government Survey 2024: Accelerating Digital Transformation for Sustainable Development."

category, representing a notable leap from its previous standing in the "Middle EGDI" category.[8] Pakistan has a teledensity of 75%, with 165 million mobile phone subscribers and 77 million internet users. The country holds significant growth potential if the population is empowered with affordable communication technologies and digital literacy. Such efforts could dramatically enhance Pakistan's standing in the Telecommunication Infrastructure Index and Human Capital Index.

Moreover, focused efforts are needed for government entities to enhance service delivery through information and communication technologies. Despite the promotion of ICTs for digital service delivery—such as Government-to-Government (G2G), Government-to-Citizen (G2C), and Citizen-to-Government (C2G) interactions—many government departments in Pakistan should focus on developing strategies to expand the use of ICT for efficient public service delivery.[9]

The Network Readiness Index Report (NRI) 2023

The NRI Report 2023 focuses on enhanced ICT competitiveness and development. It evaluates the policies, factors, and institutions that enable countries to leverage ICTs for sustainable growth and well-being. The NRI provides a holistic framework for assessing the multi-dimensional impact of ICT on society while identifying aspects that will become critical for adopting new technologies in the coming decades.[10]

The latest NRI report maps the network-based readiness of 134 countries, analyzing four key factors: Technology, People, Governance, and Impact. Pakistan ranks 90th out of 134 economies in the NRI 2023. Its primary strength lies in the Technology pillar, where it has shown notable improvement. However, the greatest scope for further progress remains in the Governance pillar, which continues to be a concern.

8. "UN E-Government Survey 2024: Accelerating Digital Transformation for Sustainable Development," *United Nations*, 2024. https://desapublications.un.org/publications/un-e-government-survey-2024
9. J, Clement. "E-Government Development Index (EGDI) 2020, by Country," *Statista*, August 26, 2020. https://www.statista.com/statistics/421580/egdi-e-government-development-index-ranking/.
10. Network Readiness Index, Portulans Institute, 2023. https://networkreadinessindex.org/countries/

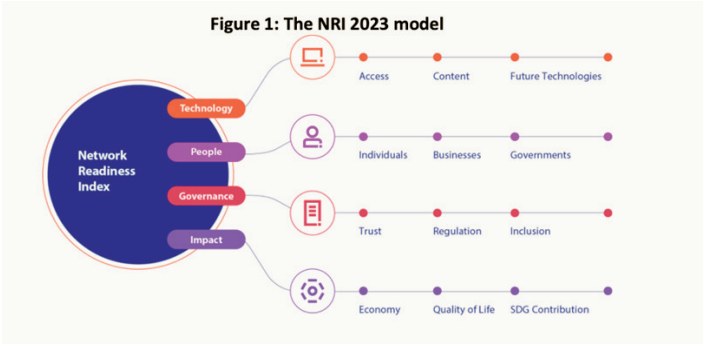

Figure 1: NRI 2023; Source: Network Readiness Index 2023[11]

Specifically, Pakistan is ranked 49th in the Technology pillar, 89th in the People pillar, 117th in the Governance pillar, and 93rd in the Impact pillar, as shown in Figure 2.

Figure 2: Pakistan's global ranking, overall and by pillar.
Source: Network Readiness Index 2023.[12]

As discussed earlier, with 60% of its population under the age of 35 and a median age of 22.8—8 years younger than the global average—Pakistan possesses immense human potential. By equipping its youth with the right skills, particularly digital skills that align with the digital ecosystem, the country can develop a trained workforce to serve as a cornerstone of the knowledge economy. Currently, over 100 universities in Pakistan produce more than 25,000 ICT graduates annually. However, it is crucial for Pakistan to not only improve the quality of these graduates but also significantly increase the number of ICT graduates to at least 100,000 per year to meet the demands of a rapidly evolving digital economy.

11. Network Readiness Index, Portulans Institute.
12. Network Readiness Index.

Global Digital Readiness Index 2023

The Global Digital Readiness Index 2023, published by Computer Information Data System Company (CISCO), evaluates global economies based on their digital readiness across three stages: Activate, Accelerate, and Amplify. The index ranked 146 countries, with Pakistan positioned at 120th. A country's digital readiness is assessed through several factors, including basic needs, business and government investments, ease of doing business, human capital, the start-up environment, technology adoption, and technology infrastructure.

Singapore ranked the highest on the Global Digital Readiness Index 2023 with a score of 2.37, followed by Luxembourg and Iceland. Pakistan, with a score of 7.77 out of 25, was placed in the "Accelerate" stage. Its performance across the sub-pillars was as follows: 0.64 out of 4 in Basic Needs, 0.37 out of 3 in Business and Government Investment, 0.85 out of 4 in Ease of Doing Business, 1.89 out of 4 in Human Capital, 0.62 out of 3 in Start-Up Environment, 1.19 out of 3 in Technology Adoption, and 0.88 out of 4 in Technology Infrastructure.

Global Cybersecurity Index 2024

The GCI 2024, published by the ITU, aims to promote cybersecurity awareness and evaluate countries' commitment to cybersecurity across various sectors and applications.[13] The GCI evaluates countries based on five key pillars: legal, technical, organizational, capacity building, and cooperation. The 2024 report ranks countries by region and highlights global leaders in cybersecurity readiness. Singapore is recognized as the most committed nation globally, achieving a perfect index score of 100. It is followed by Switzerland with a score of 97.55, and Denmark in third place.[14] The 2024 GCI ranks Pakistan at 40th, marking a significant improvement from its previous 79th position. This advancement has elevated Pakistan to the Tier-1 (Role Modeling) rating. A detailed discussion of each GCI-ITU pillar is provided in Section 2.

13. "Global Cybersecurity Index 2024," *International Telecommunication Union*, 2024. https://www.itu.int/pub/D-HDB-GCI.01-2024.
14. "Global Cybersecurity Index 2024."

The GCI 2024 utilizes a robust and comprehensive framework laid down below to evaluate the cybersecurity readiness of countries globally. While the assessment strategy is well-structured, there are still areas where further refinements could enhance its effectiveness.

Comprehensive Cybersecurity Framework: The GCI evaluates cybersecurity readiness across five key pillars: Legal, Technical, Organizational, Capacity Development, and Cooperation. It assesses countries' commitment to cybersecurity initiatives, with a particular focus on legislative frameworks, technical preparedness, and cooperative measures to address cyber threats.

Tier-Based Evaluation: The GCI 2024 employs a tier-based system, categorizing countries into five performance tiers, ranging from Tier 1 (Role-Modeling) to Tier 5 (Building). This shift from a purely numerical ranking to a tier-based approach helps highlight regional leaders and pinpoint areas for improvement. It also enables countries to benchmark their progress more effectively against peers.

Regional Disparities and Capacity Gaps: The report underscores significant regional disparities in cybersecurity capabilities. High-income countries typically have well-established national cybersecurity strategies and functional Computer Incident Response Teams (CIRTs). In contrast, lower-income countries often struggle with resource allocation and capacity development, particularly in safeguarding critical infrastructure and advancing child online protection initiatives.

The next section encompasses a critical analysis of the GCI pillars to evaluate the benchmarks—examining their relevance, effectiveness, and the key areas they cover—before analyzing Pakistan's performance in detail.

Critical Analysis of GCI – 2024 – Areas of Strength

Holistic Approach: The GCI's assessment strategy encompasses five key pillars—Legal, Technical, Organizational, Capacity Development, and Cooperation—offering a comprehensive evaluation of a country's cybersecurity posture. This approach ensures that countries are assessed not only on their technical capabilities but also on their legislative frameworks,

institutional support, and international cooperation, all of which are vital for achieving holistic cybersecurity.

Tier-Based System: By implementing a tier-based structure (spanning Tier 1 to Tier 5), the GCI transitions away from a simplistic ranking system, which can often feel limiting or reductive. This approach clusters countries with others at comparable levels of cybersecurity development, shifting the focus from competition over numerical rankings to promoting collaboration and knowledge-sharing within each tier. Additionally, it provides a platform to recognize regional champions—countries that may not yet rank among the global leaders but are making noteworthy progress in advancing their cybersecurity capabilities.

Inclusivity and Global Perspective: The assessment evaluates cybersecurity readiness across a wide range of geopolitical regions, ensuring the index represents both advanced economies and developing nations. This inclusive approach promotes a global dialogue on cybersecurity, enabling countries at various stages of development to learn from each other. The document's focus on capacity-building in under-resourced regions is particularly vital for pursuing equitable global cybersecurity progress.

Critical Analysis of GCI – 2024: Weaknesses and Areas for Improvement

Heavy Emphasis on Policy and Strategy: While the focus on legal and organizational measures is undoubtedly important, the strategy risks placing too much weight on the existence of policies and frameworks, potentially overlooking their actual effectiveness. Simply having a cybersecurity policy or law in place does not ensure proper implementation. The assessment could be strengthened by incorporating a more detailed analysis of how these policies are enforced and their tangible impacts, such as through case studies or post-implementation evaluations.

Overgeneralization in Regional Tiers: While the tier-based system offers several advantages, it may inadvertently lead to overgeneralization within the tiers. For example, two countries in the same tier could face vastly different challenges and possess distinct strengths. One country might excel in capacity building but struggle with technical infrastructure, while anoth-

-er might have advanced technical tools but lack international cooperation. Adding further granularity within the tiers could provide more nuanced insights into each country's unique situation, enabling policymakers to address localized challenges more effectively.

Limited Focus on Emerging Threats: The strategy may face criticism for not adequately addressing emerging cybersecurity threats, such as AI-driven attacks, deepfakes, and nation-state-sponsored cyber warfare. The existing GCI pillars do not explicitly measure how well countries are prepared to tackle next-generation cyber threats, which are likely to become increasingly critical in the coming years. Expanding the technical pillar to include specific metrics on resilience to these emerging threats would create a more forward-looking and comprehensive assessment.

Reliance on Self-Reported Data: The index's heavy reliance on self-reported data introduces potential biases, as countries might overstate their cybersecurity readiness to appear more secure or underreport due to insufficient data collection infrastructure. Incorporating third-party audits or leveraging verifiable cybersecurity incident data could improve the reliability of the assessment and mitigate the subjectivity inherent in self-reported responses.

Lack of Weighting and Prioritization: The five pillars of the GCI are not explicitly weighted, leaving ambiguity about which areas are most critical for a country's overall cybersecurity posture. For instance, technical readiness may be more vital for a country's immediate security than international cooperation, yet both are evaluated as if they carry equal importance. Introducing a weighting system based on factors such as risk exposure or national priorities could make the index more representative of real-world cybersecurity challenges and better aligned with individual country needs.

The previous section provided an overview of prominent international indexes, highlighting the benchmarks Pakistan should aim for and its ranking in each index to assess the country's current standing. The next section examines Pakistan's ICT landscape, its commitment to cybersecurity, current levels of preparedness, and the cyber threats facing the country.

ICT Landscape and Cybersecurity Commitment of Pakistan

The Digital Pakistan agenda has been in place for over two decades. Pakistan's first IT policy was introduced in 2000 and subsequently reviewed in the following years to address areas such as legislation, sectoral digitalization, standardization, infrastructure development, women's empowerment, human resource development, innovation promotion, local hardware manufacturing, research and development, increased software exports, and the establishment of software technology parks.[15] Pakistan's digital policy envisions becoming a strategic enabler for an accelerated digitalization ecosystem, aiming to expand the knowledge-based economy and drive socio-economic growth. However, the policy lacks substantial progress in information security initiatives, with efforts primarily limited to legal measures. These include the legalization of electronic transactions under the Electronic Transactions Ordinance (ETO-2002) and the enactment of cybercrime laws, along with the establishment of a few supporting bodies.

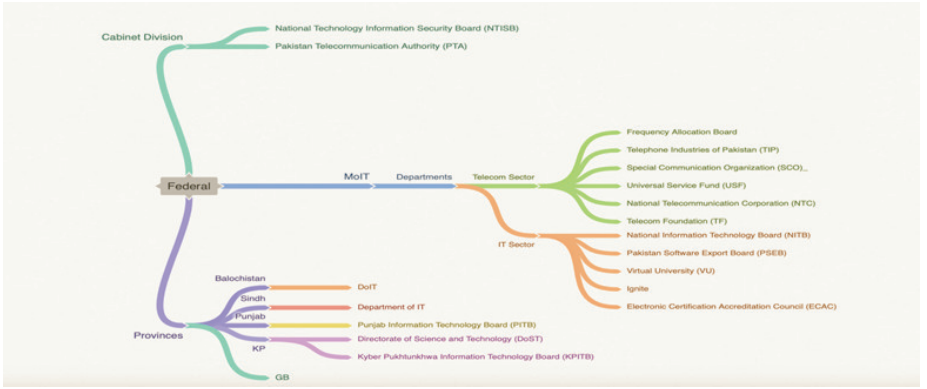

Figure 3: List of Government Departments dealing with Information Technology.
Source: Compiled by the authors (The data is open source and taken from each department's website including the Ministry of Information and Telecommunication website, Punjab Information Technology Board, Directorate of Science and Technology, KP Information Technology Board, National Technology Information Security Board, Universal Service Fund, National Telecommunication Corporation, Telecom Foundation, National Information Technology Board, Pakistan Software Export Board, Ignite, Virtual University, and Electronic Certification Accreditation Council).

The KP Digital Policy, launched in 2018,[16] introduced key initiatives aimed at aligning with Global Data Protection Regulations (GDPR) and implem-

15. "Pakistan Digital Policy," *Ministry of Information Technology*, (2020). https://moib.gov.pk/Downloads/Policy/DIGITAL_PAKISTAN_POLICY%2822-05-2018%29.pdf
16. "Khyber Pakhtunkhwa Digital Policy," *Khyber Pakhtunkhwa Information Technology Board*, (2018).https://kpitb.gov.pk/sites/default/files/Khyber%20Pakhtunkhwa%20Digital%20Policy%202018-2023.pdf

-enting standardized cybersecurity protocols across government departments. The policy also outlined regulations to safeguard data of the citizens, establish appropriate cybersecurity frameworks, and enhance transparency and accountability in digital governance. Similarly, the Punjab Digital Policy also launched in 2018,[17] aimed to transform the province into a knowledge-based economy. While the policy broadly addressed information security, it lacked a specific focus or detailed measures to tackle cybersecurity challenges effectively.

Under the Digital Pakistan policy,[18] Component one focuses on protecting personal data and ensuring online privacy to enhance transparency, security, and confidentiality of information through the implementation of a Data Protection Act. The policy also emphasizes incorporating security and privacy considerations into subsequent frameworks, such as cloud computing, e-government solutions, and the promotion of digital signatures to strengthen data security and authentication.

The National Information Technology Security Board (NTISB)[19] was renamed from the National Communication Security Board (NCSB) to address the needs of emerging technologies. The NCSB was originally established in 1959 under the Ministry of Defense, with the Cabinet Secretary serving as its chairman. The primary objective of the NTISB is to advise the Government of Pakistan on matters related to information and communication technologies and associated initiatives. Although various ministries, departments, and organizations have occasionally followed information security initiatives, however, the digital ecosystem lacks a unified approach or a dedicated body to ensure the security of Pakistan's cyberspace comprehensively.

Imminent Cybersecurity Threat

This section highlights the major cyber threats facing Pakistan, underscor-

17. "Punjab Digital Policy," *Punjab Information Technology Board*, (2018). https://pitb.gov.pk/punjab-digital-policy
18. "Pakistan Digital Policy," *Ministry of Information Technology*, (2020). https://moib.gov.pk/Downloads/Policy/DIGITAL_PAKISTAN_POLICY%2822-05-2018%29.pdf
19. National Communication Security Board (NCSB). https://cabinet.gov.pk/Detail/OWYxZTYxMWQtNDZhMC00M2IyLTk1NDgtODNmNTMxNmNlNGU0..

-ing the country's current state of vulnerability. It not only emphasizes the growing importance of cyber power in modern statecraft but also demonstrates the critical need for robust cybersecurity measures as part of an effective defense mechanism. By including this section, the authors aim to present both the strengths and weaknesses of Pakistan within the digital realm.

Patterns of Cyber Attacks against Pakistan

This section examines the volume of cyberattacks targeting Pakistan, revealing a significant rise in cyber threats. In 2023, the country experienced a 17% increase in cyber threats compared to 2022. One cybersecurity firm reported 16 million cyberattacks in 2023, with 24.4% of internet users in Pakistan affected by these threats.[20] The study further highlighted a 59% surge in banking malware, a 35% increase in trojan attacks, and a 24% rise in ransomware attacks, indicating a worrying trend in the cybersecurity landscape.[21]

Moreover, the US and Russia are reported to be responsible for the highest number of cyberattacks targeting Pakistan, with 40% of these attacks focusing on Port 443 (HTTPS). Ransomware continues to be one of the most frequently used types of malwares in these attacks.[22] Additionally, Indian hackers are often implicated in cyber espionage activities. According to a report by Norman Shark and the Shadow Server Foundation, Indian Advanced Persistent Threats (APTs) consist of small yet highly organized and nationally aligned groups that carry out coordinated attacks on Pakistan's government infrastructure.[23]

20. "Cyber threats increased by 17% in 2023," *Pakistan Tribune*, February 20, 2024. https://tribune.com.pk/story/2457021/cyber-threats-increased-by-17-in-2023#:~:text=Kaspersky%20blocked%2016%20million%20cyberattacks,the%20scale%20of%20modern%20threats.
21. "Cyber threats increased by 17% in 2023."
22. "Threat Intelligence Report," *Rewterz Information Security*, p:11, 2018. https://www.rewterz.com/threat-intelligence-reports/2018-threat-intelligence-report
23. Fagerland, S., M. Krakvik, J. Camp, and A. S. Norman, "Unveiling an Indian Cyberattack Infrastructure," *Norman Shark and Shadowserver Foundation*, 2013.

Major Cyberattacks Targeted Pakistan's Public Infrastructure for the period 2015-2024

Year	Targeted Infrastructure	Technique/Method	Impact
2015	Gateway Exchange[24]	Limited DOS	Service of International Trunk call
2016	Pakistani Websites[25]	Defacement as revenge for the Pathankot incident	Reputation Loss
2017	Top civil-military Leadership[26]	Espionage and spying through malware	Identity theft, loss of data privacy
2018	Banking System across Pakistan[27]	Ransomware	Reputation loss, security breach, data hacked, money stolen of more than $6 million
2019	Ministry of Foreign Affairs, Pakistan Army[28]	Website Defacement	Post-Pulwama Reaction / Reputation Loss
2020	K-Electric[29]	Netwalker Ransomware attack	Reputation loss
2023	Pakistan International Airline (PIA)[30]	DDos Attack	Online operations were stopped, and passengers could not access the website
2024	Pakistan Post[31]	Smishing	Stolen thousands of people personal and financial information

Source: Compiled by authors (drawing data from sources mentioned against each threat)

In October 2018, Pakistani banks across the country fell victim to major cyberattacks, suffering losses exceeding $6 million, along with significant data breaches and damage to their reputation.[32]

24. Ghumman, Khawar, "Cyberattacks against govt expose fatal cracks on Pakistan's digital fence," *Dawn Newspaper*, May 20, 2015. https://www.dawn.com/news/1182856
25. "Hacktivism: India vs. Pakistan," *Recorded Future*, February 11, 2016. https://www.recordedfuture.com/india-pakistan-cyber-rivalry/.
26. Khattak, I. "Pakistan Top Target for Foreign Espionage," *Dawn Newspaper*, January 19, 2017. https://www.dawn.com/news/1309413.
27. Qarar, S. "Almost All' Pakistani Banks Hacked in Security Breach," *Dawn Newspaper,* November 6, 2018. https://www.dawn.com/news/1443970.
28. "Pulwama Attack: Pakistani Websites Hacked," *The Times of India*, February 18, 2019. https://timesofindia.indiatimes.com/gadgets-news/pulwama-attack-pakistani-websites-hacked-heres-the-list/articleshow/68042727.cms
29. "K-Electric Services Hit by Cyberattack." *Express Tribune*, September 10, 2020. https://tribune.com.pk/story/2263343/k-electric-services-hit-by-cyberattack
30. Khaitan, Ashish. "Pakistan Cyber Attack, Team UCC Claims to Take Down Pakistan International Airlines," *The Cyber Express,* April 4, 2023. https://thecyberexpress.com/pakistan-cyber-attack-international-airlines/
31. "Smishing Triad Is Targeting Pakistan to Defraud Banking Customers at Scale." *Resecurity*, June 11, 2024. https://www.resecurity.com/blog/article/smishing-triad-is-targeting-pakistan-to-defraud-banking-customers-at-scale.
32. Qarar, S. "Almost All' Pakistani Banks Hacked in Security Breach, Says FIA Cybercrime Head," November 6, 2018. [Online]. Available at: https://www.dawn.com/news/1443970

A month later, in November 2018, over 150,630 payment cards from Habib Bank of Pakistan and 12 other banks were stolen and sold on the dark web.[33] In April 2019, following the Pulwama incident, Indian hackers compromised the official website of Pakistan's Ministry of Foreign Affairs, rendering it inaccessible from several countries outside Pakistan In January 2020, during a cyber-espionage campaign, the Israeli NSO Group targeted numerous Pakistani government officials' mobile phones using spyware. The intended victims included journalists, attorneys, political dissidents, senior foreign government officials, diplomats, and human rights activists.[34]

More recently, K-Electric experienced a severe ransomware attack demanding $38 million, marking one of the most significant cyber incidents. In 2024, the country faced its largest scam of the year, involving a smishing campaign by a cybercriminal group. The attackers sent malicious messages via iMessage and SMS, posing as Pakistan Post, to mobile carrier customers. Their goal was to steal financial and personal information. The templates and codes used in this scam showed clear similarities to those from earlier incidents attributed to the Smishing Triad group.

These patterns illustrate the wide range of cyberattacks targeting Pakistan from both state and non-state actors. According to leading global cybersecurity firms such as Symantec, Pakistan ranks among the top ten most targeted countries globally. This claim is further substantiated by the Snowden documents released in 2013 and 2014, which revealed that the U.S. National Security Agency (NSA) had been spying on Pakistan's civil and military leadership using malware codenamed SECONDATE.

Considering these trends, coupled with the objectives outlined in the Digital Pakistan vision, it is critical to prioritize Pakistan's cybersecurity commitment. Strengthening the core cybersecurity pillars in alignment with the Global Cybersecurity Index is essential for improving resilience and preparedness.

33. Zaidi, E. "Cyber Attackers Steal 150,632 Plastic Cards Data of Three Banks," *The News,* November 17, 2018. https://www.thenews.com.pk/print/394589-cyber-attackers-steal-150-632-plastic-cards-data-of-three-banks.
34. Kirchgaessner, Stephanie, "Israeli Spyware Allegedly Used to Target Pakistani Officials' Phones," *The Guardian*, December 19, 2019. https://www.theguardian.com/world/2019/dec/19/israeli-spyware-allegedly-used-to-target-pakistani-officials-phones.

The next section offers targeted recommendations to address these challenges and strengthen Pakistan's cybersecurity framework.

Pakistan's Cyber Wellness Profile and Policy Recommendations

Pakistan is positioned in the Tier 1 – Role-Modelling category, signifying that it has demonstrated strong cybersecurity measures. Other countries in this tier include Singapore, the US, and the United Kingdom. Countries in this category excel across all five pillars: legal, technical, organizational, capacity development, and cooperation, setting a benchmark for global cybersecurity standards.

When comparing Pakistan with five other countries in Tier 1, Singapore and the United Kingdom stand out due to their strong capacity development initiatives and well-established cybersecurity organizations. Malaysia and India, also in Tier 1, show growing commitments but are still in the process of developing certain technical measures. Turkey, another Tier 1 nation, emphasizes improving its cybersecurity cooperation efforts, particularly about international agreements. Pakistan's progress in implementing foundational cybersecurity regulations and strengthening cooperation mechanisms places it on par with other leading nations in the tier. However, compared to countries like Singapore and the US, Pakistan would benefit from further advancements in technical and organizational measures to achieve a more robust cybersecurity posture.

The GCI 2024 assessment strategy takes a comprehensive approach to evaluating global cybersecurity readiness by focusing on three key elements: *Multi-Pillar Assessment Approach:* Cybersecurity commitments are assessed across five pillars: Legal, Technical, Organizational, Capacity Development, and Cooperation. This multidimensional framework offers a holistic perspective on a country's cybersecurity maturity and highlights strengths and areas needing improvement.

Tier-Based Performance Model: Instead of relying on rank-based systems, the index categorizes countries into tiers (e.g., "Role-Modeling" to "Building"). This approach emphasizes performance trends while minimizing misinterpretation caused by minor score differences often seen in ranking systems.

Capacity Development and Cooperation: The strategy prioritizes raising cybersecurity awareness, skill-building initiatives, and fostering global partnerships. It acknowledges that human expertise and international collaboration are critical to advancing cybersecurity measures worldwide.

Pakistan's response to cyber incidents is largely reactive and impulsive, which stands in contrast to globally established best practices that emphasize proactive and strategic approaches. The country has not actively developed comprehensive information or cybersecurity policies and strategies to safeguard its information assets. This section evaluates Pakistan's existing cybersecurity preparedness based on the GCI of the International Telecommunication Union. It also provides recommendations and actionable strategies tailored for developing countries, focusing on improving Pakistan's cybersecurity posture. These recommendations aim to help Pakistan and similar nations strengthen their information security frameworks and move toward a more robust and proactive cyber defense strategy.

Recommendations

Legal Measures

The Government of Pakistan has taken a few notable legislative steps to address cybersecurity and online safety. Key initiatives include the ETO of 2002 and the Prevention of Electronic Crimes Act (PECA) of 2016. Pakistan also has specific legislation addressing child online protection, though enforcement often relies on broader laws like Section 293 of the Criminal Code. Furthermore, Pakistan is among the countries that have ratified international treaties prohibiting the sale of children, child prostitution, and child pornography, obligating the state to prevent the sexual exploitation and abuse of children. However, the country faces significant challenges in implementing and enforcing these laws. Pakistan lacks a dedicated authority responsible for online child protection, as well as a proper mechanism for reporting such incidents. This institutional gap hinders the effective execution of these legislations and undermines efforts to ensure the safety and security of children in the digital space.

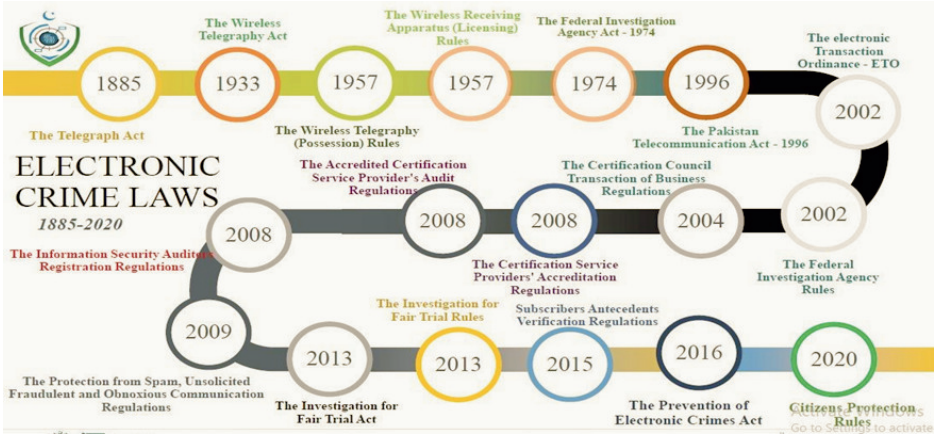

Figure 4: List of Cyber Laws in Pakistan Source: Compiled by Author [35]

The Data Protection Bill holds significant potential for shaping Pakistan's digital IT and e-commerce strategy by fostering economic competitiveness. It seeks to balance creating an enabling environment for Pakistani digital exporters to access foreign markets while safeguarding against the risks of data colonization. However, the bill currently overlooks vulnerable segments of society, such as minors, women, transgender individuals, and minorities. To ensure equitable protections, it is critical to explicitly address these groups within the legislation. Moreover, personal data for minors should be classified as sensitive to provide additional safeguards against exploitation and harm, ensuring their rights and privacy are adequately protected in the digital sphere

In this regard, a constitutional body or independent organization should be created to oversee cybersecurity matters at the national level. Currently, the National CERT operates under the Ministry of Information Technology (MoIT) and derives its authority from CERT rules under the Prevention of Electronic Crimes Act (PECA) 2016. However, a separate legal entity is required to better empower national, sectoral, and regional CERTs, ensuring a more comprehensive and coordinated cybersecurity framework. The Personal Data Protection Bill should be passed on a priority basis to build a robust data protection ecosystem in Pakistan. This legislation is critical for addressing privacy concerns, safeguarding personal information, and enabling the growth of Pakistan's digital economy in alignment with global data protection standards.

35. Zahoor, Rashida and Razi, Naseem, "Cyber-Crimes and Cyber Laws of Pakistan: An Overview," *Research Journal of Arts and Humanities,* Vol.2, o. 2, 2020. https://www.prjah.org/index/php/prjah/article/download/43/27

Technical Measures

Technology is widely regarded as the first line of defense against cyber threats, and in its absence, nation-states remain vulnerable and susceptible to cyberattacks. To mitigate these risks, countries should establish and enforce minimum security criteria and accreditation mechanisms to ensure a baseline level of cybersecurity readiness. These measures should be supported by the establishment of a dedicated national body tasked with focusing on cyber incidents and a centralized framework designed to coordinate responses to such incidents effectively. At present, Pakistan lacks an officially recognized National Information Security Policy, which is a critical gap in its cybersecurity infrastructure. While a cybersecurity policy does exist, it remains in the development phase and has not been fully implemented, leaving the country exposed to growing digital threats. Accelerating the implementation and enhancement of this policy is essential for building a robust national cyber defense framework.

The government or National CERT should develop the capacity to implement technical measures like Security Operations Centers (SOC) and Security Information and Event Management (SIEM) systems at both national and sectoral levels. These measures should ensure the delivery of proactive and reactive cybersecurity services across all critical sectors, enhancing the nation's ability to detect, prevent, and respond to cyber threats.

Building effective cyber threat intelligence (CTI) and situational awareness requires active participation in local and international cyber threat-sharing networks. Platforms like the Forum for Incident Response and Security Teams (FIRST) provide advisory services to protect cyberspace, making them critical for advisory sharing, collaboration, and incident response. Interaction with such networks can strengthen Pakistan's overall security posture.

Information security objectives should be aligned with national security goals while fostering an environment that promotes innovation, free data exchange, and a thriving technology ecosystem. Given the strategic overlap with national security, the defense sector should be treated as a key stakeholder. Many nations have structured their governance models around

the defense sector to ensure better coordination and security integration.

Pakistan should develop a well-defined cybersecurity policy and strategy with clear objectives, a roadmap, and actionable steps. This should include a governance model and defined milestones, a cyber strategy maturity model to track progress, a compliance framework with accountability and responsibility matrices, standards for compliance, quality assurance, and capacity building, a detailed list of services, their impact on sectors, and their timelines for implementation.

Regulating cyberspace should become a priority, with adherence to information security laws, regulations, standards, and guidelines. Compliance efforts will improve data management capabilities, reduce vulnerabilities, and build a stronger security posture across government departments and critical industries. Effective governance, management, enforcement, capacity building, and risk assessment require a comprehensive suite of software and hardware tools. To reduce dependency on foreign technologies, promoting the local electronic industry and encouraging indigenous manufacturing of cybersecurity tools and systems must be prioritized.

This approach will build self-reliance and improve national resilience against external threats. In this regard the is a need to equip national and sectoral Computer Emergency Response Teams (CERTs) with indigenous technologies and capabilities to reduce dependency on foreign tools and solutions. Additionally, the development of a robust policy, technology, and operational mechanism is required to ensure seamless collaboration between CERTs and other organizations responsible for safeguarding digital assets. The creation of a comprehensive cyber governance framework that empowers and enables the broader cybersecurity ecosystem is needed. Furthermore, the formulation of national information assurance (IA) policies and frameworks based on international best practices are needed i.e., UAE IA Regulations, UK Cyber Essentials, and ISO 27001.

Organizational Measures

Organizational measures play a pivotal role in the effective execution of national initiatives, especially those aimed at achieving strategic goals in cyb-

-ersecurity. To ensure success, it is imperative to establish dedicated national agencies tasked with implementing strategies, monitoring progress, and evaluating outcomes. Without a cohesive national-level strategy, a supervisory body, and a clear governance framework, efforts to bolster cybersecurity will remain disjointed, making it impossible to achieve harmony and progress in this critical domain. In Pakistan, the establishment of the Pakistan National CERT (PAK NCERT) marks a significant step in safeguarding the country's digital assets, critical infrastructure, and sensitive information from cyberattacks, cyber terrorism, and cyber espionage. PAK NCERT's core functions include detecting, preventing, and responding to cyber threats; raising national awareness about cybersecurity; promoting research and development in the field; formulating cybersecurity policies and strategies; and fostering international cooperation to tackle cross-border cyber threats.

Operating under the National CERT framework are specialized CERTs designed to address specific areas of cybersecurity. Government CERTs focus on securing government systems and data, while Sectoral CERTs are responsible for protecting key industries such as finance, healthcare, and energy. Provincial CERTs cater to region-specific cybersecurity needs, and Critical Infrastructure CERTs are tasked with safeguarding vital infrastructure, including power grids, telecommunications, and transportation systems. Together, these entities form a comprehensive approach to fortifying Pakistan's cybersecurity landscape.

This body should be formally mandated to lead the development and implementation of the national information security policy and strategy, as well as to devise supporting frameworks, policies, and directives to ensure a secure cyberspace in Pakistan. Additionally, the body should coordinate with all stakeholders involved in the national information security policy and ensure that all key deliverables are achieved. It should also develop technologies, processes, and capacities to plan, monitor, identify, detect, and respond effectively to information security-related activities. The national body can formulate a comprehensive national information and cybersecurity policy, along with a supporting strategy, aligned with national security needs, international norms, and global benchmarks. Thus, a central body should be established to take ownership of the cybersecurity mandate in Pakistan.

While the National CERT is an excellent initiative, it requires robust organizational support and a framework for long-term sustainability. Establishing a legal entity to prioritize the cybersecurity agenda in Pakistan would provide the National CERT with a solid legal and institutional foundation, enabling it to operate effectively and address the country's cybersecurity challenges.

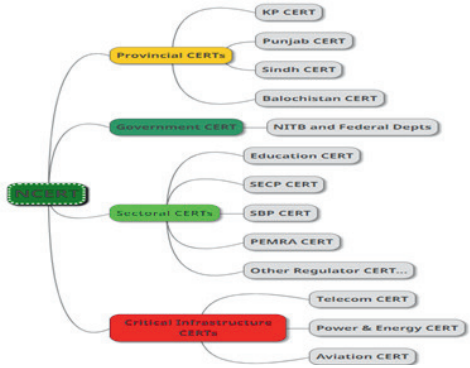

Figure 5: National Computer Emergency Response Team and departments under it. Source: Compiled by authors[36] data drawing from CERT Rules, Ministry of Information Technology and Communication, October 3, 2023).

Capacity Building Measures

Human and institutional capacity building is indispensable for highlighting the significance of cybersecurity, raising awareness, fostering knowledge for systematic solutions, and enhancing the professional human resource pool. Effective capacity building is assessed through key factors such as research and development, training programs, education, certified professionals, and the effectiveness of public sector agencies. However, Pakistan currently lacks a national-level framework for implementing cybersecurity certifications and accrediting national agencies, leaving a critical gap in its ability to systematically develop and sustain a robust cybersecurity ecosystem.

Cloud infrastructure can significantly enhance a country's cybersecurity posture by offering scalable, resilient, and cutting-edge security measures. For Pakistan, which has achieved Tier 1 "Role-Modelling" status in the

36. "CERT Rules," *Ministry of Information Technology and Communication*, October 3, 2023. https://moitt.gov.pk/Detail/MTBmMGQ3NDItOWM2Mi00N2M0LWE1ZGUtMjRlNWJlOGYwZGU0

ITU's GCI 2024, leveraging cloud infrastructure presents an opportunity to further fortify its cybersecurity framework in several keyways:

Scalability and Flexibility: Cloud services provide the ability to scale resources up or down based on demand, ensuring that security measures remain responsive and adaptive to varying threat levels. This eliminates the need for significant capital investment in infrastructure, allowing for a cost-effective and efficient approach to cybersecurity.

Advanced Security Features: Leading cloud providers offer built-in security tools, including encryption, identity and access management, and continuous monitoring. These features are often more robust and comprehensive than traditional on-premises solutions, providing enhanced protection against evolving cybersecurity threats.

Regular Updates and Patch Management: Cloud providers ensure timely management and deployment of security patches, minimizing vulnerabilities associated with outdated software and enhancing overall system security.

Disaster Recovery and Business Continuity: Cloud infrastructure provides robust disaster recovery solutions, ensuring data integrity and availability even during cyber incidents.

Cost Efficiency: Utilizing cloud services allows organizations to reduce expenses associated with maintaining physical hardware, enabling them to allocate resources more effectively toward enhancing security protocols.

For Pakistan, integrating cloud infrastructure aligns seamlessly with its ongoing cybersecurity initiatives while addressing critical areas for improvement. One, Cloud platforms can support training and development programs, contributing to the creation of a skilled cybersecurity workforce capable of addressing emerging threats; Two, Cloud-based security solutions can significantly improve incident response capabilities and enable real-time threat detection, bolstering Pakistan's cybersecurity framework; Three, Cloud services facilitate enhanced collaboration between public and private sectors, promoting information sharing and coordinated responses to cyber threats, which are essential for a

resilient cybersecurity ecosystem. By strategically adopting cloud infrastructure, Pakistan can significantly strengthen its cybersecurity defenses, maintain its prestigious Tier 1 "Role-Modelling" status in the ITU's GCI, and set an example for other nations aspiring to enhance their cybersecurity frameworks.

Thus, a comprehensive framework to address the cyber skill gap is essential and should be adopted by the Higher Education Commission (HEC) and other skill development bodies, such as NAVTTC and similar organizations. The National Institute of Standards and Technology (NIST) has developed an effective model for capacity building in cybersecurity, known as the National Initiative for Cybersecurity Education (NICE), which can serve as a valuable reference for such efforts. In addition to institutional initiatives, public awareness campaigns play a vital role. PAK-CERT actively engages in disseminating cybersecurity awareness through advertisements and special promotional campaigns, ensuring that the public is educated about cybersecurity risks and best practices.

Pakistan should prioritize the dynamic nature of technology and its implications for national security. Recognizing the ever-evolving threat landscape, efforts are underway in research and development (R&D) to stay ahead of these challenges. A significant step in this direction is the establishment of the National Cybersecurity Center (NCCS) under Air University, Islamabad, which has set up 12 advanced laboratories across the country. These labs aim to strengthen Pakistan's cybersecurity capabilities through innovative research and skill development. Additionally, further initiatives are expected to foster indigenous solutions through collaboration with the local industry, ensuring that Pakistan develops a self-reliant and robust cybersecurity ecosystem.

The Cloud Policy approved three years ago, requires further operationalization through the establishment of policies and an enabling framework for cloud operators to effectively conduct business in Pakistan. This step is crucial for the public sector to harness the full potential of regulated public clouds and thrive in a cloud-powered digital ecosystem. Adopting agile technology models such as Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS) in the public sector can only be achieved if the Public Procurement Regulatory Author-

-ity (PPRA) simplifies and streamlines cloud procurement processes for government entities. Such reforms would not only lower technology adoption costs by 70-80% but also significantly reduce deployment timelines, enabling faster and more efficient technology integration across the public sector.

Cloud computing enhances cybersecurity by enabling organizations to develop, deploy, and operate secure technology solutions more efficiently. To maximize these benefits, the proposed centralized cyber body should take the lead in facilitating and promoting the adoption of cloud-based cybersecurity solutions. The demand and supply gap in the digital skills market, particularly in the cybersecurity industry, is widening. To address this challenge, the HEC and the proposed cybersecurity body must collaborate closely to promote local talent and foster indigenous research and development.

Cooperation Measures

Dealing with cybercrime necessitates a multi-stakeholder approach, both domestically and internationally, with active input from all relevant parties. These efforts are assessed based on the effectiveness of cooperative frameworks, partnerships, and information-sharing networks. A key objective of the recently established PAK-CERT is to foster international cooperation with other global CERTs, enhancing Pakistan's ability to address cross-border cybersecurity challenges. Pakistan is also a member of the ITU-IMPACT initiative, providing quick access to its cybersecurity-relevant services. Additionally, the country secured a four-year term (2018-2022) on the ITU Administrative Council, becoming one of the thirteen nations elected to this trans-governmental body from the Asia and Australia regions. Pakistan is also a member of the Asia Pacific Security Incident Response Coordination Working Group (ASPIRC-WG). These memberships and partnerships contribute significantly to strengthening Pakistan's cybersecurity profile, particularly in cooperative measures and international collaboration.

The Government of Pakistan is actively working to engage in various international mechanisms related to cybersecurity. However, a more focused effort is required to align these initiatives with international bodies

and standards. By channeling its potential effectively, Pakistan can address capacity-building and cooperation challenges, thereby enhancing its global standing and readiness in the cybersecurity domain.

Pakistan should prioritize the initiation of bilateral and multilateral agreements with countries and entities that hold and process data belonging to Pakistani citizens. To strengthen its cybersecurity framework, Pakistan could also collaborate with China to launch capacity-building programs focused on training research and development. Furthermore, the government should foster public-private partnerships with locally established companies to enhance capacity in the cybersecurity domain. Notably, the approval of the Mutual Legal Assistance (Criminal Matters) Act in 2020 provides a robust legal foundation for facilitating cooperation and coordination with both domestic and international stakeholders.

The government should actively pursue inter-agency partnerships and agreements among various governmental bodies to strengthen coordination and collaboration in the realm of cybersecurity. Such partnerships are vital for creating a unified approach to addressing cyber threats and enhancing national resilience. Under PAK-CERT, fostering international cooperation is a key objective. This initiative not only facilitates the development of advanced cybersecurity capabilities but also supports the sharing of cyber threat intelligence.

Pakistan should establish strong linkages with other countries and international bodies to facilitate the exchange of information on cyber threats and collaborate on cybersecurity and data protection initiatives. In this way, Pakistan can leverage its cybersecurity and data protection capabilities as key tools for cyber diplomacy.

Conclusion

Pakistan's geopolitical situation presents unique challenges, having been at the center of various disruptive events over the past three to four decades. Despite these challenges, the emergence of information technology as a critical driver of national development provided an opportunity for Pakistan to leverage its potential to its advantage. Unfortunately, this potential has not been fully realized.

Cybersecurity, recognized globally as the fourth dimension of warfare, remains an area of concern for Pakistan. The country's information security posture is not encouraging, given the increasing threats tied to digital transformation, data sovereignty, and digital access. Pakistan is frequently targeted by cybercriminals, facing challenges such as financial losses. These threats underscore the urgent need to establish core information security capabilities to protect the country's critical assets.

The cyberwarfare landscape is intensifying, and without a long-lasting and comprehensive mechanism to safeguard its CIs and other high-value assets, Pakistan remains vulnerable. This paper reviews the reasons behind Pakistan's current information security challenges and explores its potential to improve its cybersecurity ranking in global indexes.

As the fifth most populous nation, with an average age of around 22 years, Pakistan has significant potential to expand its ICT sector and address the digital divide. Focusing on information security as a national priority will enable Pakistan to strengthen its ICT commitment, build capacity, and drive socio-economic growth. Currently, Pakistan lags its regional competitors in both ICT growth and information security rankings. Prioritizing ICT development and integrating key economic growth indicators into its strategic vision will ensure a smoother digital transition and help Pakistan compete on the global stage.

Book Reviews

1

The Unfinished Quest: India's Search for Major Power Status from Nehru to Modi

T.V. Paul (Oxford University Press, 2024), 280

The Unfinished Quest: India's Search for Major Power Status from Nehru to Modi

T.V. Paul (Oxford University Press, 2024), 280

Mobeen Jafar Mir*

'The Unfinished Quest: India's Search for Major Power Status from Nehru to Modi' is written by T.V. Paul, a distinguished scholar and professor in the Department of Political Science at McGill University in Montreal, Canada. Throughout his esteemed career in international relations, Professor Paul has held numerous prestigious academic and visiting positions at leading institutions around the globe. He earned his Ph.D. in Political Science from the University of California, Los Angeles. His research covers a broad range of important themes, including international security, international relations theory, conflict and war, nuclear proliferation, and the politics of South Asia.

In his latest volume, Paul examines India's leadership strategies, highlighting significant achievements in economic growth, technological advancements, and military modernization through his extensive expertise in international relations. Nonetheless, he argues that India's aspirations are obstructed by domestic constraints, regional challenges, and structural limitations. The book frames India's ambitions within a broader competition for international status, defined as the "collective international recognition of an actor based on its valued material and non-material attributes."

Paul points out two significant missed opportunities in India's pursuit of global status: its exclusion from a permanent seat on the United Nations Security Council (UNSC) in 1945 and its classification as a non-nuclear state in 1968. He suggests that these setbacks have created enduring obstacles to India's ambitions as a great power, despite its advancements in

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economic, military, and technological areas. Regionally, India faces opposition not only from Pakistan but also from other smaller neighboring countries, which highlights the challenges it encounters in effectively utilizing its hard and soft power strategies. Domestically, issues such as unequal wealth distribution, limited access to education and healthcare, and underdeveloped infrastructure continue to hinder India's global aspirations.

Following the preface, the book is structured into seven chapters. Broadly, the first three chapters titled *The Pursuit*, *Hard Power*, and *Soft Power* analyze the evolving markers of India's international status. The author highlights the importance of the 2005 US-India Nuclear Accord, which recognized India as a de facto nuclear power despite its non-signatory status to the Nuclear Non-Proliferation Treaty (NPT).

In *The Pursuit*, the author explores the motivations and limitations of India's elite in their quest for global recognition, emphasizing socio-psychological, material, and philosophical factors. He attributes India's incremental status gains to its strong Gross Domestic Product (GDP), strategic role as a swing state counterbalancing China, and institutional recognition through memberships in the Group of Twenty (G-20) and the Quad Alliance framework. In the subsequent chapters entitled *Hard Power* and *Soft Power*, the author evaluates India's military, economic, scientific, and technological capabilities and demographic strength. He examines the impact of India's soft power, focusing on cultural influence, civilization, political systems, diplomacy, strategy, and the global Indian diaspora.

In the subsequent chapters *The Great Powers*, *The Neighbours*, and *State Capacity*, the author assesses the policies of major powers such as the US, China, Russia, France, and the United Kingdom toward India's ambitions, while briefly addressing the evolving strategies of Japan and Germany. He also highlights India's outreach to the Global South as part of its strategy to enhance global influence. The author contends that regional dominance is essential for achieving global power status but argues that India's regional position has often been precarious. This is due to persistent border disputes, strained relations with neighbors, and the growing influence of external powers like China, which challenge its dominance and generate hostility from its South Asian neighbors.

In the chapter *State Capacity*, the author identifies the lack of inclusive development as a critical barrier to India's global aspirations. The chapter examines key development indicators such as education, infrastructure, healthcare, and climate change, comparing India with global peers like China. The author asserts that India's progress is hindered by a "weak state syndrome" and argues that without significant improvements in its Human Development Index (HDI), its aspirations for global power will remain unrealized.

In the final chapter, *The Future*, the author contends that while material indicators are essential, they are insufficient for India to achieve major power status. He posits that India's most viable path lies in its "accommodation and acceptance" by the US as a crucial ally, particularly in the context of countering China's growing influence.

In conclusion, the book provides a valuable scholarly analysis of the motivations and underlying factors driving India's pursuit of global power status. While being insightful, the book has certain limitations added. The author overemphasizes India's moral objectives during its early independence, despite historical evidence suggesting that personal, psychological, and material ambitions played a more significant role. Furthermore, the book underscores India's disproportionate focus on high-status technologies, such as nuclear and space advancements, at the expense of applied sciences critical for addressing urgent challenges like poverty, illiteracy, and famine.

Paul traces India's nuclear ambitions back to 1944, even before its independence, noting that Nehru in 1946 acknowledged the inevitability of states pursuing atomic technology. While Nehru emphasized its constructive potential, he also asserted India's right to self-defense if threatened. In contrast, Pakistan's nuclear program emerged in the 1970s, spurred by India's 1974 nuclear tests, as reflected in Zulfikar Ali Bhutto's 1965 statement: *"If India makes an atomic bomb, we will also do so, even if we have to eat grass or go hungry."* India's claim that its nuclear weapons were developed solely for security purposes, however, remains questionable, especially in light of China's declared No First Use (NFU) policy. Remarks by former Indian Prime Minister I.K. Gujral, linking nuclear weapons to international status, further highlight the ambiguity.

Additionally, India's actions—such as the annexation of Hyderabad, the Kashmir conflict, and the annexation of Goa in 1961—culminating in its 1974 nuclear tests, compelled Pakistan to pursue its nuclear program. Furthermore, the establishment of the Nuclear Suppliers Group (NSG) in response to India's nuclear tests highlights how India's ambitions influenced global non-proliferation frameworks, challenging its claims of advocating for disarmament during the Cold War.

Lastly, the claim that India has an "impeccable non-proliferation record" is misleading. Despite the NSG waiver, India's eight civilian nuclear reactors remain outside of the International Atomic Energy Agency's (IAEA) safeguards system, which raises significant concerns about accountability and transparency of nuclear material. Additionally, more than twenty cases have been reported repetitively on the smuggling of critical and objectionable material from India since the mid-1990s. Such reoccurring episodes suggest lapses and loopholes in the Indian nuclear safety and security culture and the absence of a regulatory mechanism to govern nuclear and radioactive material. This also suggests the possible existence of a black market in India where unauthorized movements take place repetitively. Economically, while India has experienced notable growth since the 1990s, inequality within India persists largely. Wealth is concentrated among the top 10%, while 129 million people live in extreme poverty. According to the October 2024 Global Hunger Index, India ranks 105th out of 127 countries, categorized as "serious."

India's democratic trajectory also raises concerns in the context of US-India relations. The rise of Hindutva ideology, extraterritorial killings, and the marginalization of minorities have drawn international criticism. Freedom House downgraded India from a "free" democracy to "partially free," the V-Dem Institute classified it as an "electoral autocracy," and the Economist Intelligence Unit ranked India 53rd in its 2020 Democracy Index. Policies such as the Citizenship Amendment Act (CAA), the National Register of Citizens (NRC), and the revocation of Jammu and Kashmir's special status have further eroded India's democratic image on the global stage.

2

Indian Ocean as a New Political and Security Region

Frédéric Grare and Jean-Loup Samaan (Oxford University Press, 2022), 232

Indian Ocean as a New Political and Security Region

Frédéric Grare and Jean-Loup Samaan
(Oxford University Press, 2022), 232

Hamna Ghias Sheikh*

The book *Indian Ocean as a New Political and Security Region* by Frédéric Grare and Jean-Loup Samaan offers a comprehensive analysis of the Indian Ocean's transformation into a pivotal geopolitical and security arena. Grare, a Senior Policy Fellow at the European Council on Foreign Relations (ECFR) and a non-resident senior fellow at the Carnegie Endowment for International Peace, along with Samaan, a Senior Research Fellow at the Middle East Institute of the National University of Singapore and Associate Researcher with the French Institute of International Relations, bring their extensive expertise to this study.

This comprehensive work moves beyond the historical role of the Indian Ocean as a maritime trade route to examine its emerging status as a strategic hub. The central theme of the *Indian Ocean* as a *New Political* and *Security Region* is the transformation of the Indian Ocean Region (IOR) into a pivotal geopolitical and security arena. The book explores the evolving strategic dynamics in the region, driven by the intersecting interests of major global powers, emerging regional actors, and shifting economic and security landscapes. It emphasizes the growing competition for influence among global and regional powers like the United States, China, and India, while also examining the roles of European states, Gulf Arab monarchies, Association of Southeast Asian Nations (ASEAN) countries, Australia, and Africa.

In the first and *Introductory* Chapter, the authors analyze key geopolitical shifts, security challenges, and the intersecting strategic interests of the US,

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China, and India alongside the influence of regional organizations. They critically evaluate the policies and initiatives of these stakeholders, addressing their implications for regional stability and global maritime governance. With contributions from leading scholars and practitioners, this book provides a nuanced understanding of the evolving political and security dynamics of the Indian Ocean. It serves as a timely resource for policymakers, academics, and professionals seeking insights into the region's significance in twenty-first-century geopolitics.

Chapter two, *The Advent of China's Indian Ocean Strategy*, provides a comprehensive analysis of China's strategic initiatives and its growing role in the IOR. The chapter traces China's historical ties to the Indian Ocean, rooted in ancient maritime trade routes, and examines their contemporary revival through initiatives such as the Belt and Road Initiative (BRI). Key strategic investments and infrastructure projects along the Indian Ocean littoral, including the development of the Gwadar Port in Pakistan and the Hambantota Port in Sri Lanka, are analyzed within the broader framework of China's Maritime Silk Road strategy, highlighting their geopolitical significance and security implications.

The chapter also underscores China's early recognition of the geopolitical importance of the IOR, illustrated by its inaugural port visits to Pakistan, Bangladesh, and Sri Lanka in 1985–1986. These visits marked a significant milestone in Chinese naval capabilities and strategic outreach in the region. However, subsequent port calls were delayed until the mid-1990s, by which time China had become a net importer of oil. This shift emphasized the economic imperatives behind its naval activities in the IOR, particularly the need to secure maritime trade routes for energy resources. The authors also highlight China's efforts to secure Sea Lines of Communication (SLOCs) through naval diplomacy and partnerships, responses from other powers such as the US and India, and the economic impacts of China's investments. The chapter underlines concern over debt sustainability in recipient countries and internal debates within China about military strategies for ensuring energy security in the Indian Ocean.

Chapter Three, *Between East and West: India's Revived Engagements*, provides a nuanced analysis of the evolving geopolitical dynamics between China and India in the IOR over the past two decades, particularly in the

context of the BRI. It emphasizes the central role of India in the region, driven by its economic growth and increasing need for energy supplies and raw materials, paralleling the strategic priorities of China. In response to China's growing influence, India has strengthened its relationships with states in the Persian Gulf and Africa while forming partnerships with key regional powers such as Japan, France, and the US. The authors also discuss India's efforts to enhance its regional influence through initiatives like trilateral frameworks involving small island states in the Indian Ocean. In collaboration with Japan, India has pursued infrastructure development projects aimed at countering China's growing influence in East Africa, Eastern countries, and Southeast Asia. These strategic moves have prompted India to redefine its policy in the Indian Ocean, adopt a more prominent regional role, and cautiously expand defense partnerships with various regional actors.

In chapter four, titled *The US, the Reluctant Offshore Balancer of the Indian Ocean Rivalries*, the authors examine the evolving role of the US in the IOR. Historically, the US has treated the region as a secondary priority, which has allowed China to expand its influence. Despite this, the authors emphasize that the US remains a key player due to its significant military presence, with its regional interests largely driven by economic competition with China. The chapter contextualizes the Indian Ocean within the framework of great power rivalry between China and India while highlighting the limited US engagement with other regional players, such as South Africa and the Arabian Gulf countries. This limited engagement is exemplified by recent developments, including the strengthening of relations between the Arab Gulf states, Iran, and China, which reflect shifting dynamics in the region. Moreover, the authors argue that these changes underscore the need for the US to reassess its approach to the IOR if it aims to maintain its influence amid growing competition.

Chapter Five, *The UK and France: A European Struggle for Regional Influence*, discusses how France and the UK are reasserting their presence in the IOR through strategic partnerships in Africa and ASEAN. Historically perceived as a competitive arena for European powers, the region's dynamics are now influenced by global financial constraints. The authors argue that Europe should adapt its economic policies, particularly in Africa, to effectively compete with emerging powers such as China.

Furthermore, Chapter Six, *The Gulf Arab Monarchies: From Gateways to Strategic Players in the Indian Ocean?* analyzes the transformation of Gulf Arab monarchies—such as Saudi Arabia, Qatar, and the United Arab Emirates (UAE)—from being mere gatekeepers to becoming active strategic players in the region. Their increased investments and military engagements have enhanced their influence but have also introduced complexities, as demonstrated by tensions like those between UAE and Qatar in the Horn of Africa.

The subsequent chapter titled *Australia and the ASEAN Member States: From Interest to Commitment?* examines the evolving roles of Australia and ASEAN as they shift from passive observers to active participants in Indian Ocean affairs. The chapter highlights Australia's strategic adjustments in response to China's growing influence and explores the internal challenges faced by ASEAN in formulating a unified stance on regional issues, given its diverse member states and competing priorities. Furthermore, in the second last chapter titled Indian Ocean Africa: From Mere Stakeholder to Future Power Broker? Grare and Samaan focus on Africa's transformation from a passive stakeholder to a potential power broker in the IOR. The chapter underscores Africa's increasing integration into global initiatives, such as China's BRI, signaling a departure from historical colonial dependencies. The authors emphasize Africa's strategic efforts, particularly by East African states, to attract regional powers by leveraging their abundant natural resources.

The last chapter *Rethinking the Indian Ocean Security Architecture*, reevaluates the security framework of the IOR, advocating for a governance-oriented approach rather than one driven by competitive dynamics. The authors stress the importance of strengthening multilateral frameworks to mitigate potential conflicts and enhance regional stability. They propose pragmatic strategies to strengthen existing regional organizations while pursuing new cooperative frameworks among states and institutions. This collaborative approach aims to prevent the IOR from becoming a battleground for global powers. Instead, the authors emphasize the need for joint efforts to manage and govern the region's complex geopolitical landscape, promoting sustainable and inclusive security solutions.

While the book provides a comprehensive and insightful analysis of the evolving dynamics in the IOR, its predominantly Western perspective may inadvertently narrow the scope of its analysis. The emphasis on the strategic interests and policies of Western powers, particularly those of the US and European countries, often overshadows the perspectives and initiatives of regional actors. Although China's growing influence and strategic activities are well-documented, the analysis frequently frames them through Western strategic lenses, potentially underemphasizing China's developmental role in the region.

Similarly, the examination of regional powers like India and the Gulf Arab monarchies often centers on their interactions with Western states and their competition with China, rather than fully exploring their independent regional strategies and roles. This focus may limit a deeper understanding of the autonomous contributions of these actors to the evolving geopolitical and security landscape of the IOR.

3

Brave New Words: How AI Will Revolutionize Education (and Why That's a Good Thing)

Salman Khan (Penguin Random House, New York, 2024), 265

Brave New Words: How AI Will Revolutionize Education (and Why That's a Good Thing)

Salman Khan (Penguin Random House, New York, 2024), 265

Rubia Shaukat*

Artificial Intelligence (AI) is transforming education and Salman Khan's *Brave New Words: How AI Will Revolutionize Education* offers a compelling exploration of this shift. The book, organized into eight chapters, examines the role of AI—particularly Generative Pre-Trained Transformer (GPT) technology—in reshaping classrooms, personalizing learning, and addressing educational inequities. Written for educators, parents, and students, Khan blends practical advice with visionary predictions about how AI can fundamentally enhance teaching and learning experiences. Drawing on his experience as the founder and CEO of Khan Academy—a globally acclaimed online learning platform—Khan shares valuable insights and recounts his journey of integrating OpenAI's advanced large language models (LLMs) into education. The book highlights the immense potential of AI to reshape teaching and learning in profound ways.

As a prominent figure in Education Technology (EdTech), Salman Khan adopts a forward-thinking and optimistic perspective. Rather than approaching tools like ChatGPT with skepticism, he advocates for an open-minded and proactive stance. He encourages parents and educators to embrace AI's possibilities while acknowledging its imperfections. Khan demonstrates how AI can personalize learning, enhance assessments, and support classroom activities in innovative ways, complementing traditional educational methods to create more engaging and impactful learning experiences.

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Beyond the technical applications, *Brave New Words* explores the broader societal implications of AI in education. Khan addresses practical considerations for administrators, guidance counselors, and hiring managers, highlighting how AI can improve both educational systems and workplace practices. The book also explores the ethical and social dimensions of AI, offering thoughtful reflections on how these tools can be leveraged to create a more equitable and accessible education system for learners worldwide.

While this book provides a fascinating and optimistic vision for the future of education, the book occasionally overlooks some of the deeper challenges of AI implementation. For instance, while Khan acknowledges concerns about bias in AI algorithms, the discussion could have delved deeper into how systemic inequalities embedded in data sets might perpetuate or even exacerbate inequities in education. Furthermore, while he emphasizes AI's potential to democratize access to learning, the book assumes a level of global infrastructure readiness—such as access to devices and reliable internet—that is not yet a reality for many communities worldwide. These practical hurdles could have been explored more thoroughly to provide a more balanced perspective.

The launch of GPT-4 in May 2024 marked a transformative milestone in AI development, captivating audiences with its human-like conversational abilities and real-time responsiveness. This breakthrough redefined human-AI interactions, making them feel seamless and natural. In *Brave New Words*, Khan describes GPT-4 as a groundbreaking development for education. He envisions a future where every student has access to a personal AI-powered tutor, and every teacher benefits from an AI assistant, revolutionizing the learning and teaching processes. Through a structured, chapter-by-chapter analysis, Khan outlines how AI will reshape education, noting that several of his predictions have already materialized since the book's publication. His core argument emphasizes AI's potential to dramatically improve student outcomes and teacher experiences, paving the way for a future where world-class education is universally accessible.

However, Khan's vision of AI as a personal tutor and assistant might underestimate the complexities of teacher-student relationships. Education is not just about knowledge transfer; it also involves emotional intelligence,

mentorship, and interpersonal dynamics that are difficult, if not impossible, for AI to replicate. While AI can handle routine tasks and provide instant feedback, it cannot replace the uniquely human aspects of teaching, such as fostering empathy, inspiring creativity, and addressing individual emotional needs. These limitations are touched upon but could have been explored in greater depth to temper some of the book's optimism.

While skepticism around EdTech persists—due to concerns about its effectiveness, its potential to exacerbate inequality and fears of reducing personal interaction in education—Khan presents a compelling counterargument. Drawing on his experience and the development of Khanmigo, an AI-powered tutor, he argues that AI offers a scalable and cost-effective solution to the challenges of traditional education. Providing human tutors for every student is economically impractical, but AI-powered tutors can democratize access to personalized learning. Khan illustrates this with vivid examples, such as students engaging in immersive, virtual conversations with historical figures to bring history to life. He even recounts his virtual interactions with fictional characters, like Jay Gatsby, showcasing the creative possibilities AI brings to education.

Yet, some readers may question whether Khan's enthusiasm for AI-powered tools underestimates the risks of overreliance on technology. For instance, while he rightly highlights AI's ability to engage students in innovative ways, the book does not sufficiently address concerns about students losing critical thinking skills or becoming overly dependent on AI for problem-solving. Balancing the use of AI with promoting independent thought remains a crucial challenge that educators must navigate carefully.

AI-powered tools are also revolutionizing how students approach writing tasks. These tools offer real-time feedback on outlines, logical coherence, and areas requiring further research. They identify gaps in evidence, unclear ideas, and unaddressed counterarguments while providing suggestions to refine language and strengthen arguments. Khan acknowledges concerns about whether using AI constitutes cheating but compares it to widely accepted tools like spellcheckers or Grammarly. When used responsibly, AI collaborates with students rather than working for them, helping them overcome challenges and move projects forward. This perspective has gained traction among educators, many of whom initially resisted AI but

now encourage its thoughtful integration to support student learning.

Looking ahead, Khan stresses that proficiency in AI will become an essential skill across professions, including education. He argues that AI will not replace teachers but will empower them by managing time-consuming routine tasks such as lesson planning, grading, and monitoring student progress. Unlike earlier EdTech solutions that failed to reduce teachers' workloads, AI offers transformative support. By automating administrative responsibilities, AI enables educators to focus on inspiring students, building meaningful relationships, and providing individualized attention to those who need extra support.

However, integrating AI into schools comes with challenges, which Khan addresses candidly. He advocates for robust systems to protect student privacy, mitigate algorithmic biases, and bridge gaps in access to devices and connectivity, ensuring equitable opportunities for all learners. While these recommendations are important, the book might have benefited from more concrete strategies or case studies on how to implement these safeguards effectively.

Khan ultimately views AI as a transformative equalizer in the classroom, with the potential to revolutionize education on a global scale. Brave New Words: How AI Will Revolutionize Education is highly recommended for anyone interested in the future of AI in education. As a pioneer in EdTech, Salman Khan envisions a future where AI makes education more personalized, inclusive, and impactful—fundamentally changing how we teach and learn for the better. While the book provides an inspiring vision of AI's potential, readers may wish for a deeper exploration of the challenges and trade-offs involved in integrating AI into education.

Acronyms

List of Acronyms

AEOI	Atomic Energy Organization of Iran
AIIB	Asian Infrastructure Investment Bank
AI	Artificial Intelligence
APTs	Advanced Persistent Threats
ASAT	Anti-Satellite Weapon
ASMP-A	Air-Sol Moyenne Portée-Amélioré
ASPIRC-WG	Asia Pacific Security Incident Response Coordination Working Group
AUKUS	Australia-UK-US
BCIM	Bangladesh-China-India-Myanmar Corridor
BIMSTECH	Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation
BJP	Bharatiya Janata Party
BMD	Ballistic Missile Defence
BRF	Belt and Road Forum
BRICS	Brazil, Russia, India, China and South Africa
BVR	Beyond Visual Range
CAA	Citizenship Amendment Act
CEP	Circular Error Probable
CERT	Cybersecurity Emergency Response Teams

CIRTs	Computer Incident Response Teams
CISCO	Compute Information Data System Company
CNES	National Centre for Space Studies
COP	Conference of the Parties
CPEC	China-Pakistan Economic Corridor
CTBT	Comprehensive Nuclear Test Ban Treaty
CTCN	Climate Technology Center and Network
CTI	Cyber Threat Intelligence
C2G	Citizen-to-Government
DCNS	Direction des Constructions Navales Services
DESI	Digital Economy and Society Index
DRDO	Defence Research and Development Organization
EdTech	Education Technology
DESI	Digital Economy and Society Index
DRDO	Defence Research and Development Organization
EdTech	Education Technology
EGDI	E-Government Development Index
ENR	Enrichment and Reprocessing

ETO	Electronic Transactions Ordinance
EU	European Union
EU-3	France, the United Kingdom, and Germany
FDI	Foreign Direct Investment
FIRST	Forum for Incident Response and Security Teams
FTA	Free Trade Agreement
GCI	Global Cybersecurity Index
G2C	Government-to-Citizen
C2G	Citizen-to-Government
G2G	Government-to-Government
GDP	Gross Domestic Product
GDPR	Global Data Protection Regulations
GPT	Generative Pre-Trained Transformer
HCI	Human Capital Index
HDI	Human Development Index
HEC	Higher Education Commission
HEU	Highly Enriched Uranium
ICANN	Internet Corporation for Assigned Names and Numbers

IAEA	International Atomic Energy Agency
IDI	ICT Development Index
IMF	International Monetary Fund
INFRUS	India-France-US
IOR	Indian Ocean Region
IoT	Internet of Things
IPCC	Intergovernmental Panel on Climate Change
IRGC	Iran's Islamic Revolutionary Guard Corps
JCPOA	Joint Comprehensive Plan of Action
IBMC	International Business Machines Corporation
IAF	Indian Air Force
IaaS	Infrastructure as a Service
ICT	Information and Communications Technology
IPCC	Intergovernmental Panel on Climate Change
ISRO	Indian Space Research Organisation
ITU	International Telecommunication Union
LEU	Low-Enriched Uranium
LLMs	Large Language Models

MDL	Mazagon Docks Limited
MoIT	Ministry of Information Technology
MoU	Memorandum of Understanding
MTCR	Missile Technology Control Regime
NATO	North Atlantic Treaty Organization
NCAI	National Centre for Artificial Intelligence
NCSB	National Communication Security Board
NDMA	National Disaster Management Authority
NGOs	Non-Governmental Organizations
NICE	National Initiative for Cybersecurity Education
NIST	National Institute of Standards and Technology
NPCIL	Nuclear Power Corporation of India
NPP	Nuclear Power Plant
NPT	Nuclear Non-Proliferation Treaty
NRC	National Register of Citizens
NRI	Network Readiness Index
NSA	National Security Agency
NSG	Nuclear Suppliers Group
NTISB	National Information Technology Security Board

NUST	National University of Sciences & Technology
OSI	Online Service Index
OTP-1	Operation True Promise-1
OTP-2	Operation True Promise-2
PaaS	Platform as a Service
PAF-IAST	Pak-Austria Fachhochschule Institute of Applied Sciences and Technology
PECA	Prevention of Electronic Crimes Act
PoK	Pakistan-occupied Kashmir
PPRA	Public Procurement Regulatory Authority
R&D	Research and Development
SAARC	South Asian Association for Regional Cooperation
SaaS	Software as a Service
SAGAR	Security and Growth for All in the Region
SCO	Shanghai Cooperation Organization
SIEM	Security Information and Event Management systems
SIPRI	Stockholm International Peace Research Institute
SLOCs	Sea Lanes of Communication
SMRs	Small Modular Nuclear Reactors

SPCAI	Sino-Pak Centre for Artificial Intelligence
SR-SAM	Short-Range Surface-To-Air Missiles
SSA	Smaller South Asian states
SSN	Nuclear-Powered Submarine
TEC	Technology Executive Committee
TII	Telecommunication Infrastructure Index
UAE	United Arab Emirates
UNDP	United Nations Development Program
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
UN	United Nations
USD	United States Dollar

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