INDIA'S SUBMARINE FORCE MODERNIZATION AND ITS ROLE IN STRATEGIC DETERRENCE

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Abstract

The emergence of competition among 21st-century maritime powers has transformed the underwater region into an important region of deterrence and strategic influence. In the case of India, the modernisation of its submarine forces is not only related to enhancing the naval power but also the construction of a credible deterrent like diesel-electric attack submarines (SSKs) and the enhancement of the second-strike capabilities, which are critical to national security. This research paper examines the development of the submarine modernisation force of India, taking the Arihant-class nuclear-powered ballistic missile submarines (SSBNs), the conventional classes of Kalvari and project 75I, and analyses the limitations in its operation, keeping in perspective the competition in the region by China and Pakistan[1]. It examines how this program can support India's deterrence strategy, with consideration of survivability, strategic stability, and power politics in the Indian Ocean Region (IOR). The research argues through qualitative methods, such as defence white papers, doctrinal study and recent strategic reports, that India is strengthening its maritime deterrence capability through the induction of Scorpene-class conventional attack submarines and Arihant-class nuclear-powered ballistic missile submarines. While Indian submarine modernisation has contributed to a more effective maritime deterrent strategy, issues related to persistent delays in indigenous propulsion technology and lack of operational redundancy during strategic maritime deployments have hindered this effort. Policies are recommended to increase AIP, which has been proven in the sea, to focus on the sustainability of SSBNs and patrolling, enhance industrial propulsions, and create regional confidence-building strategies to minimise crisis instability. The research paper ends with one argument that a strong and locally made submarine power is important in order to maintain India's strategic autonomy and significantly prevent regional aggression.

Keywords: India's Submarine Modernisation, Strategic Deterrence, Second-Strike Capability, Indian Ocean Region, Sea-Based Nuclear Deterrence.

Introduction

The maritime power is one of the main concepts of strategic power throughout history. The ocean with its vast depths and hidden world provides a strategic domain where important tools of modern statecraft operate in near silence.

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The submarines can be regarded as one of these hidden tools of influence for India, as a denial and assurance weapon; they deny an opponent the right to use sea lanes freely, yet ensure that India has effective retaliatory measures in case it should be attacked. From the Cold War to the Indo-Pacific period[2], countries have been increasingly using the underwater capability as a means of deterrence, intelligence collection and projection of power.

The survivability, endurance and stealth of submarines have become an important deterrent weapon, and it is the case in the nuclear policy requirement of the second-strike nuclear capability. In the case of South Asia, it has gained much significance as India endeavours to elevate strategic stability amidst regional rivalry with an explicit orientation towards creating and maintaining a retaliatory credible capability. India, with its proclaimed "NO-FIRST USE" and "CREDIBLE MINIMUM DETERRENCE Doctrine,"[3] needs safe, survivable capabilities to overcome any attack and deliver a potent retaliation. The motives behind this investment in submarine capabilities by India are pretty clear: need to have a credible submarine nuclear deterrent, the growing strategic naval strength of China presents a threat, and the regional tensions with Pakistan cannot be ignored[4]. These motivators are also supported by Geography. The chokepoints around the state of Hormuz, the entry to the Arabian Sea and the Malacca state are of concern to the economic and security of India. The Indian Ocean is a significant trading route. In such a way, a submarine force that can act in these areas unnoticed is a platform of the navy and a political tool.

This research paper examines the role of modernisation of Indian submarines to enhance its deterrence policy and contribute to regional stability in South Asia. It examines the doctrinal, technological and geopolitical dimensions of modernisation with an evaluation of the successes and failures. The primary question that is behind this research is:

- How does the modernisation of India's submarine force influence the deterrence policy and credibility of its role in the changing security dynamics of the Indian Ocean Region?
- To what extent do current and planned programs (Arihant-class SSBNs, Scorpene-class SSKs, and Project 75I) enhance India's second-strike capability and operational readiness?

This paper hypothesises that India's modernisation of its submarine force improves its credibility by increasing second-strike capabilities, but ongoing technological, industrial and operational challenges continue to hinder its potential for credible deterrence.

Literature Review

Previous studies on India's maritime security emphasise the rising awareness of the Indian Ocean as a geopolitical contest.

Scholars such as David Brewster and Raja Menon, in their book "SILENT FRONTIERS", emphasise how India's modernisation of its submarine force enhances its strategy of deterrence, particularly in the Indian Ocean Region *(Brewster & Menon, 2014)*[5]. They believe that India's maritime strategy has been realigned from being coastal defence-oriented to prioritising power projection and deterrence. This is in line with India's larger objective of securing strategic autonomy while coping with China's assertive People's Liberation Army Navy (PLAN) presence in the Indian Ocean Region.

India's defence experts, such as C. Uday Bhaskar and Bharat Karnad, state that the introduction of Arihant-class submarines gives India a triad-based defence, completing the sea component of its nuclear establishment *(Bhaskar, 2016; Karnad, 2015)*[6]. Studies in institutions like the Institute for Defence Studies and Analyses (IDSA) state that India's Project 75 and Project 75I aim to modernise its old conventional submarines, which will increase its sea defence and strengthen its spying capabilities[7].

These experts emphasise the importance of nuclear-powered submarines, particularly INS Arihant, in strengthening India's nuclear deterrence capabilities by improving strategic credibility and dealing with regional security concerns such as those from China and Pakistan. This assist in demonstrating strength and combating security challenges in the region, primarily from China and Pakistan. Some significant research warns that factors such as indigenisation setbacks, budgetary issues, and technological deficits (particularly with AIP Propulsion and sub-surface communications) prevent India from fully increasing its deterrence.

According to Vipin Narang, although India's concept of credible minimum deterrence provides a coherent strategic framework, its practicality is hindered by the low level of SSBNs utilisation and the existence of some command and control programs *(Narang, 2014)*[8]. Some strategic analysts agree that submarines are key to maintaining a credible sea-based deterrence system; yet they hold conflicting views regarding whether India has developed sufficient SSBNs to achieve a credible second strike capability. This research aims to address this gap in the literature by analysing the process of Indian submarine modernisation from theoretical, technological and geopolitical perspectives. Existing literature examines India’s submarine modernisation from technological or doctrinal perspectives. This research bridges these dimensions by integrating operational, geopolitical and deterrence-related analysis within the broader Indian Ocean security environment.

Methodology

The study is based on qualitative analytical approach methods, which analyses India's submarine capabilities in comparison with other actors in the region like China and Pakistan.

The research is primarily based on secondary data collected from official defense reports, strategic studies literature, academic books, peer reviewed journal articles, and policy reports published by recognized institutions such as Stockholm International Peace Research Institute (SIPRI), International Institute for Strategic Studies (IISS), Institute for Defense Studies and Analyses (IDSA), Observer Research Foundation (ORF) and the U.S. Department of Defense.

The Arihant project and the INS Arihant are the prime examples to be used to analyse the dynamics of modernisation and deterrence. The study put emphasis on the interpretative analysis by linking theoretical aspects of strategy and deterrence with empirical developments in submarine modernisation. The study uses purposive sampling to select sources directly related to submarine deterrence, nuclear strategy, maritime security, operational capability and regional strategic competition involving China and Pakistan. Data has been collected through document analysis, focusing on India's nuclear doctrine, submarine procurement programs, Air Independent Propulsion developments, command-and-control systems and evolving maritime security dynamics in the Indian Ocean Region.

Objectives

The research objective of this study is as follows: to examine the key elements and evolution of Indian submarine modernisation programs and specifically how these changes improve its capacity for deterrence and second-strike capability. To identify the barriers and obstacles that undermine the effectiveness of submarine-based deterrence in India. To assess the impact of the growth of India's submarine force on the strategic stability of the Indian Ocean Region.

Conceptual Framework

The conceptual framework of the study revolves around the overlap of military modernisation, deterrence theory and regional security dynamics and an emphasis on how the modernisation of the Indian submarine force raises its nuclear deterrence within the Indian Ocean Region. It makes use of the development of sea-based weapons, the strategic logic of deterrence and India's need for strategic stability in relation to adversaries such as China and Pakistan. Submarine modernization is a component of larger strategic deterrence that improves survivability, second-strike credibility and regional influence through which national security goals are achieved.

Linking Modernization to Deterrence

The core of this approach is submarine modernization in reaction to perceived external threats. India is modernizing its submarine force with aim of balancing its power with regional rivals such as Pakistan and China and to protect its national sovereignty. Investments in nuclear-powered submarines (SSBNs) are a credible deterrent by which states guarantee second-strike capability.

Thus, the 2003 Nuclear doctrine emphasises "credible minimum deterrence" and "No-First Use Policy (NFU)" is relevant to the modernisation process. From the realist perspective, states are rational actors where power competition shapes states' interests[9]. From a realist perspective, India's efforts to modernise its submarine force reflect an attempt to maintain a favourable balance of power in response to China's expanding maritime capabilities and Pakistan's increasing reliance on nuclear weapons for deterrence.

India's submarine capacities have increased substantially, with the induction of Kalvari-class submarines for conventional attacks and Arihant-class submarines that operate using nuclear energy to launch ballistic missiles. This links modernisation with realist concepts of power and survival with India's self-reliance strategy.

Deterrence Theory and Second-Strike Assurance

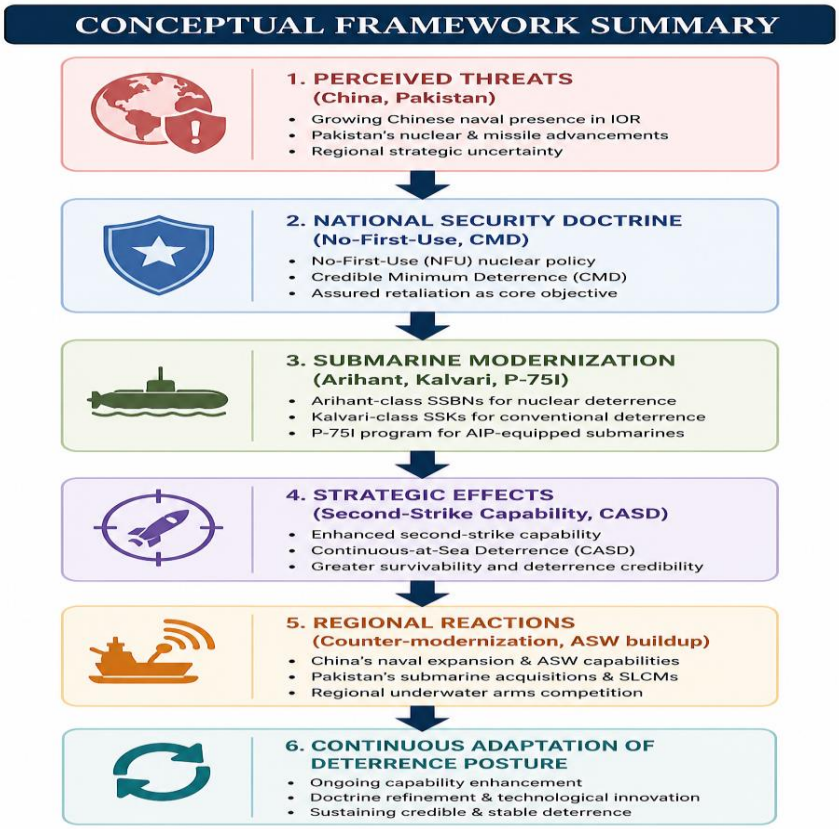
Deterrence theory is a central pillar of the conceptual framework, which says deterrence is only effective if an adversary thinks retaliation is both possible and inevitable[10]. Submarines are important to nuclear strategy because they ensure second-strike capability. India's modernisation efforts include the development of nuclear-powered ballistic missile submarines that are armed with K-15 Sagarika short-range submarine-launched ballistic missiles and K-14 intermediate-range submarine-launched ballistic missiles developed to achieve a survivable deterrent, making sure they are credible, survivable and operationally ready.

Security Dilemma and Regional Interaction

The security dilemma describes how the development of nuclear weapons is seen as a threat by other states, leading to an arms race and instability[11]. China and Pakistan view India's modernisation as an aggressive capability. The People's Liberation Army Navy (PLAN) has expanded its presence in the Indian Ocean Region, and Pakistan's procurement of Hangor-class submarines from China encourages reciprocal modernisation. The regional threats are influenced by India's activities, leading to countermeasures and changing the overall strategic landscape. The deterrence balance contributes to diplomatic signalling, the clarity of doctrine and technological advances in strategic capabilities.

The conceptual framework indicates that India's submarine modernisation works at three interrelated levels: doctrinal, technological and geopolitical. This enhances deterrence capacity and solidifies India's interest as a responsible nuclear power with reinforcement of India quest to achieve strategic autonomy and prestige in world security politics.

Figure 1. Conceptual Framework Summary of India's Submarine Modernization and Deterrence Strategy



Source: Developed by the author based on Schelling (1966), Waltz (1979), Narang (2014), Rehman (2015), Brewster (2023), SIPRI (2024), and U.S. Department of Defense (2024)

Historical Background: India's Submarine Trajectory

India's submarine force development has been a gradual process from a coastal defence force to defensive maritime assets with a strategic sea component. The cold War era marked by submarine purchases (Foxtrots of Soviet origin and later Kilo derivatives) was used for coastal defence and regional purposes[12]. These early platforms were primarily used for localised deterrence at sea and training, but have limited endurance and stealth. The era and India's growing international interests were accelerated by the plans for indigenisation and capability expansion. The Sindughosh (kilo) and Shishumar (HDW) classes introduced in the early 1980s and 1990s, respectively, increased India's presence and enhanced its capacity to patrol the Arabian Sea. India's nuclear tests in 1998 formalised its nuclear doctrine and highlighted the need for a maritime deterrent.

The foundation of India's naval component of strategic deterrence was intended for the launch of Project ATV (Advanced Technology Vessel), eventually leading to INS Arihant[13]. The current trajectory is centred on two programs. First, a significant infusion of traditional diesel-electric capability was provided by **Project-75 (P-75),** the Scorpene/Kalvari class program. They were constructed through a Franco-Indian Scorpene-derived partnership between the Naval Group and Mazagon Dock Limited. The Scorpene-derived boats were equipped with modern sonar suites and fire control systems. The P-75 program demonstrated India's capacity to build advanced conventional platforms in-country and delivered many boats between the 2010s and 2020s. Second, **the Arihant program** is the strategic milestone in India's domestic SSBN initiative. The lead boat and INS Arihant were launched in 2009 and officially commissioned in 2016, marking India's entry into an operational submarine nuclear-based deterrent by completing its first deterrence patrols in the late 2010s. The INS Arighaat, a second Arihant-class boat, was put into service in August 2024, which further solidifies India's slow but noticeable development of its sea-based strategic capability[14]. The Arihant program combined shipbuilding, crew training, and DRDO missile work (for sea-launched ballistic missile) to develop a credible sea-based nuclear deterrent, to achieve a long-standing objective of Indian defence policy. The concise timeline is as follows:

- **2009**: INS Arihant launched
- **2014-18**: Scorpene/Kalvari boats inducted in series.
- **2016**: INS Arihant commissioned.
- **2018-2024**: Operationalisation of sea-based deterrence, Scorpene class continues delivery.
- **29 Aug 2024**: INS Arighaat commissioned (second Arihant class)
- **15 Jan 2025**: INS Vaghsheer commissioned (sixth- Kalvari class)

This trajectory tends to explain two things: the importance of domestic industrial capacity to India's naval ambitions, as well as the expansion of capability across conventional and strategic undersea platforms.

Ongoing Modernisation Programs and Current Structure

Naval Assets of India Submarine Force

According to open source evaluations, India presently has a growing strategic SSBN capability in addition to a mix of traditional SSKs. According to recent public reports, India's inventory consists of at least two Arihant-class SSBNs (INS Arihant and INS Arighaat), several Kalvari-class (Scorpene-derived) SSKs delivered under P-75, and other older Sindhu Ghosh (Kilo-derived boats). According to the Nuclear Threat Initiative's public summary, the force currently consists of 17 diesel attack submarines and one verified operational SSBN (INS Arihant); additional Arihant-class boats have increased that capability in 2024.

Table: Simplified Indian Submarine Inventory

Class / Program	Type	Notable Boats/ Status
Arihant-class (Arihant, Arighaat)	SSBN (nuclear)	INS Arihant (commissioned 2016), INS Arighaat (commissioned 2024)
Kalvari-class (Project-75)	SSK (diesel-electric, Scorpene derived)	Multiple boats commissioned between the mid-2010s and 2025 (INS Kalvari, Khanderi, Karanj, Vela, Vagir, Vaghsheer).
Sindhu Ghosh / Kilo variants	SSK (older)	Older Russian designs are still in service in limited numbers
Future: Project-75(I)	Advanced SSKs (AIP-capable)	Competing foreign-origin designs with indigenous construction; procurement status active/negotiation phase

Source: Compiled by the author from the Nuclear Threat Initiative (2025), International Institute for Strategic Studies (2024), and official Indian Navy/Naval Group reports on the Kalvari-class submarine program. Military Balance 2024*; and Naval Group, *Commissioning of INS Vaghsheer* (2025).

Key Modernisation Programs

- **Project-75 (Scorpene/Kalvari Class)**: It provided experience in domestic shipbuilding and a contemporary conventional baseline. The Scorpene boats enhanced India's traditional underwater capabilities with the addition of contemporary sonar suites, torpedoes and modular weaponry.
- **Project-75(I)**: The goal of Project-75(I)[15] is to acquire six next-generation conventional submarines with advanced AIP and quieting, which will be constructed in India through technology transfer. Public reporting in 2025 identified a German-Indian consortium when others failed to meet sea-proven AIP Criteria. According to *Naval News (2024), negotiations and commercial finalisations* are still going on. If they are completed on time, delivery schedules indicate that the first units of submarines from a 2025 contract will be delivered in the early 2030s.
- **Arihant-Class SSBNs**: Strategic deterrence was the main goal of the Indian submarine deterrence program. The commissioning of INS Arihant completed the technical triad, while the commissioning of INS Arighaat in 2024 strengthened patrol redundancy *(SIPRI, 2024).* Because SSBNs are difficult to locate and destroy, they complicate an adversary's targeting calculus and project national resolve.
- **Propulsion and AIP Status**: Air Independent Propulsion (AIP) technology is essential for conventional submarines because it increases submerged endurance and minimises the need to surface, thereby minimising acoustic

vulnerability[16]. Reports indicate that delays in integrating AIP systems into early Scorpene boats have repercussions for operational endurance and P-75(I) procurement decisions *(Naval News, 2024)*. Nonetheless, India has been seeking local AIP solutions. Such delays affect doctrine, patterns of forces and choice of platforms besides being technical.

- **Industrial Base and Procurement Dynamics**: The Indian shipbuilding base, which comprises Mazagon Dock Limited and Hindustan Shipyard Limited, has gradually expanded its capacity to undertake advanced submarine construction and integration projects, among other newer private entrants. However, structural and technological constraints still exist. Only competitors who were able to prove sea-proven AIP and technology transfer conditions advanced, which has affected procurement decisions for P-75(I). According to recent Reuters reporting, a German-Indian joint venture was the only eligible candidate in a 2025 procurement phase, signifying advanced levels of technological capability New Delhi is setting for boats of the future *(Reuters, 2025)*[17].
- **Sensors, Weapons and Quieting**: Indian submarine modernisation program also includes upgrades in torpedoes, anti-ship missiles, sonar suites and quieting techniques. Modern sonar and fire control systems were introduced by the Scorpene boats, but the navy and shipyards continue to prioritise complete quieting and better acoustic signatures. The integration of heavyweight torpedoes and land attack cruise missiles into conventional submarine platforms increases India's deterrence flexibility and provides strategic options during a regional crisis through these programs, India has aimed to strengthen domestic defence manufacturing and reduce reliance on foreign suppliers, which is a key component of the Aatmanir Bharat (self-reliant India) initiative.

Role in Deterrence Strategy

India's Deterrence Strategy, outlined in the Nuclear Doctrine of 2003, focuses on Credible Minimum deterrence and a No-First-Use policy. The effectiveness of this doctrine relies on the ability of retaliatory forces to survive. Although air-delivered weapons and land-based missiles provide deterrence, the risk of pre-emptive attacks may reduce operational reliability. In this context, submarines provide survivability and endurance capability through Continuous-at-sea deterrence (CASD)[18]. Thus, the Arihant class(SSBNs) is essential. Each boat carries K-15 Sagarika or K-4 submarine-launched ballistic missiles (SLBMs) [19]that can reach targets up to 3500km away. India's ability to launch these missiles from secure maritime positions increases its second-strike capability. India's modern submarines also support conventional deterrence. The Kalvari-class submarines improve maritime operations in order to counter Pakistan's naval activities and prevent entry into India's Exclusive Economic Zones (EEZ).

Indian investments in the underwater surveillance systems, rescue capabilities and maritime warfare show commitment to long-term operational preparedness of submarine forces. Together, these developments transform India from a coastal defence force to a global maritime power.

Findings

Indian submarine modernisation efforts are crucial for both nuclear assurance and conventional naval deterrence, yet they face significant challenges. The effectiveness of both functions depends upon survivability during crisis situations. Submarines are the most survivable and secure part of India's nuclear triad because of operational endurance, stealth and guaranteed retaliation capability. The more SSBNs (nuclear-powered ballistic missile submarines) that are able to patrol at the same time, the less the chances that an attacker can find or neutralise them in advance. This concept is called Continuous-at-Sea Deterrence (CASD) and is regarded as a central standard in nuclear deterrence[20]. Achieving CASD, however, requires multiple SSBNs, robust sustainment structures, successful crew rotations, sound maintenance, a consistent supply base for spare parts and technical support. Operational endurance and stealth of a submarine also depend significantly on the propulsion technology. Nuclear propulsion enables SSBNs to stay submerged for prolonged periods without breaking the surface, thereby increasing endurance and operational range.

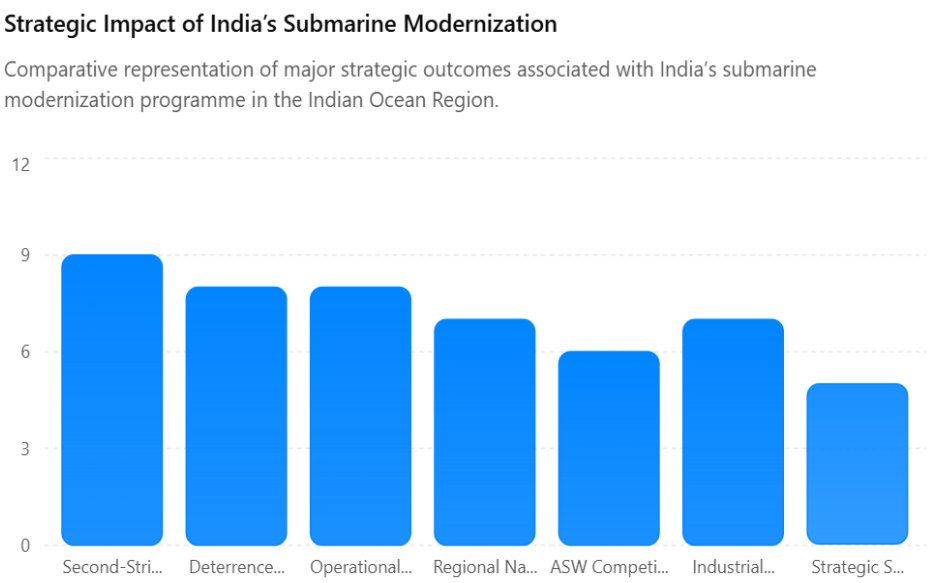
Conventional diesel-electric submarines, on the other hand, use Air-Independent Propulsion (AIP) systems to fill the gap in endurance. Delays in the induction of AIP systems have limited the conventional force's endurance to remain submerged for extended periods, heightening their vulnerability to advanced anti-submarine warfare(ASW) operations *(Naval News, 2024)*. The credibility of Indian submarines depends on operational endurance, stealth, and resilient command and control systems, all of which are essential for effective Continuous-at-Sea Deterrence (CASD). They are being tested by the acquisition of advanced submarines by Pakistan and China, and China's expanding naval presence in the Indian Ocean Region[21]. India is working to enhance its capabilities through domestic production and the planned induction of AIP-equipped submarines, though bureaucratic and procurement delays exist. The submarines of India are reliant on acoustic quieting technologies, reduced noise signatures, and reliable propulsion endurance. Secure communication networks are necessary to preserve command authority and retaliatory capacity during a crisis. India employs Very Low Frequency (VLF) communication to maintain contact with submerged submarines *(SIPRI, 2024)* [22]. Besides, submarine bases that are geographically spread enhance survivability since it becomes more challenging to target by the enemy. The east coast basing and the west coast basing of India at Visakhapatnam and Karwar, respectively, provide the Indian Ocean Region with tactical flexibility at the expense of forward logistic support and maintenance bases in the entire region.

Despite modernisation efforts, the SSBN force of India remains small in comparison with other established nuclear powers. The launch of INS Arihant was a ground-breaking move towards enabling the operationalisation of the Indian nuclear triad. The continuous patrol is, however, restricted by the presence of one or two operational SSBNs (Arihant and Arighaat) that restrict redundancy, increase pressure on maintenance, and place increased operational strain on the crew. Although the procurement of INS Arighaat in 2024 increased redundancy, India still requires one more operational SSBN with staff, an enhanced maintenance cycle, and logistical depths to sustain long-range patrols.

The Scorpene class of submarines in India are the product of the Project 75 (P-75), which introduced Kalvari class submarines into service, enhancing its conventional presence in the sea. The diesel-electric attack submarines also have sophisticated sensors and weapons, which enhance India's capability in sea denial. Nevertheless, their preventive capability is not as strong because they do not have a domestic AIP system, which restricts their capability to operate underwater. Without AIP integration, such submarines are required to resurface and then recharge their batteries, which enhances the chances of detection and limits long-duration patrols, particularly in hostile choke points or high-threat areas. The technology transfers, delays, production delays and foreign defence-industry dependency further make it difficult for India to modernise its submarines.

The strategic operational environment in the Indian Ocean Region has become more complex. As China begins to establish an offshore presence with its submarines, via patrols and the establishment of maritime bases in Gwadar and Djibouti, India is facing additional surveillance and anti-submarine threats *(Reuters, 2024)*. Another element of strategic competition is Pakistan's introduction of AIP-capable Hangor-class submarines (of Chinese origin) *(Naval News, 2023)*[23]. These trends have increased the need for India to have a high level of stealth, mobility and operational awareness. The emergence of allied intelligence, surveillance, and reconnaissance (ISR) systems and maritime patrol aircraft has increased the likelihood of submarines being detected, thus increasing the need for stealth in operations. The increasing shipbuilding capacity of India, spearheaded by Mazagon Dock Shipbuilders, and the forthcoming Project 75(I) are aimed at addressing these problems by increasing domestic production with AIP-equipped future-generation submarines. However, bureaucracy, procurement delays, and human resource availability remain a problem affecting timeframes and readiness to deploy. Proper training of personnel and sufficient training to support the psychological and operational pressures of long-range underwater patrols is also required in effective deterrence. To ensure that patrol schedules and mission success are effective, reliable maintenance schedules, crew welfare, and technical expertise are needed.

Figure 2: Strategic Effects of India's Submarine Modernisation on Deterrence Capability and Regional Security Dynamics



Source: Adapted from Institute for Defence Studies and Analyses (IDSA), "Project 75(I): Challenges in India's Submarine Modernisation," 2023

India has been working hard in the modernisation process, which has played a major role in enhancing its underwater deterrent. The Arihant-class submarines' commissioning has given New Delhi a plausible sea-based second-strike capability, one of the milestones towards guaranteed retaliation. This is not achieved, however, due to operational and industrial constraints. The power of deterrence remains limited by the size of the force, its limits of endurance and its susceptibility to communication. This is strengthened through Regional compulsions of the increasing naval strength of China and the accelerated acquisition of Pakistan.

The deterrence strategy of India therefore reflects a balance between credible deterrence and operational limitations. In spite of these hurdles, the achievements made are substantial. The modernisation of submarine forces has reinforced India's No First Use nuclear doctrine and marked a shift of India towards land-based deterrence to sea-based deterrence as it is moving towards survivability and flexibility. However, to make deterrence entirely plausible, it must be supplemented by efficient communication channels, safe data connections, enduring patrolling power and well-trained and robust human resources. Overall, the Indian underwater modernisation has been partially effective, and credible naval deterrence has been put in place, but it is yet to be fully operationalised. The long-term effectiveness of deterrent credibility is built up of a set of interrelated factors, including patrol tempo, maintenance cycles, secure communications and the self-reliance of industry and competency of crews.

Despite the encouraging direction of the projection, it still faces the long-term issue of consistency and sustainability. The submarines of India are, therefore, not merely platforms of war, but they are also an embodiment of strategic self-confidence and technological ambitions. India, through the modernisation of its submarine force, not only intends to deter but also to project itself as a responsible naval force that can maintain stability in an unpredictable neighbourhood. As the country continues to develop its command structures and build up its forces, its deterrence stance will increasingly move from reactive to robust, guaranteeing that under the smooth surface of the Indian Ocean, a quiet but unyielding frontier that protects India's strategic future.

Regional Context and Rival Response

India's military modernisation largely reflects developments in the external security environment, especially from China and Pakistan. India's modernisation of its submarines can be interpreted as a balancing strategy in response to strategic encirclement perceived by China through its String of Pearls Strategy and Pakistan's developing nuclear capabilities[24]. India's strategic environment is complicated by Chinese SSNs and SSBN patrols that are integrated with maritime logistics infrastructure throughout the Indo-Pacific.

The People's Liberation Army Navy (PLAN) has quickly increased its submarine force and established itself as a maritime navy with deployment capacities for a longer period. China currently operates at least six Type-094 Jin-class SSBNs and an increasing number of Type-093A Shang-class nuclear-powered attack submarines (SSNs), increasing anti-submarine strength and placing greater stress upon India's stealth, sensor integration, and allied intelligence alliances to guarantee Indian submarine survival *(SIPRI, 2024).* Chinese naval deployments in the Indian Ocean have also benefitted from overseas logistical staging areas, particularly in Djibouti, while Pakistan's Gwadar Port remains strategically significant within broader regional maritime connectivity initiatives *(Reuters, 2024).*

Pakistan's naval modernisation further intensifies regional dynamics. Tactical nuclear uncertainty is also in the region through Pakistan's development of Babur-3-submarine-launched cruise missiles (SLCMs)[25]. Through foreign purchases or alliances, Pakistan's naval branch has also invested in advanced submarines featuring both conventionally powered vessels and potential AIP-equipped models *(Naval News, 2023).* Pakistan's submarine advancements are contributing to rising naval rivalry in the Arabian Sea, as per recent news. India's strategic allies, such as the US, France, and Australia, offer avenues for intelligence sharing, ASW cooperation, and prospective technology transfer. Cooperation within the Quadrilateral Security Dialogue framework has strengthened maritime coordination and situational awareness in the Indo-Pacific region. Partnerships can minimise the risks of Indian SSBN detection through improving situational awareness and integrating ASW resources.

Nevertheless, alliances bring about intricate signalling as well because they take this as an anti-alignment by rivalry that disturbs strategic balancing. In order to avoid unnecessary escalation, confidence-building measures such as incident-at-sea procedures and transparency mechanisms should be required.

Implications

India's modernisation has dual consequences. It increases deterrence at the same time with competitive responses from adversaries. Regionally, it contributes to an underwater arms race in South Asia. As Pakistan proceeds with the acquisition of eight Hangor-class submarines from China, both India and Pakistan are increasingly focusing on the development of Submarine-Launched Cruise Missiles (SLCM) capabilities. At the broader Indo-Pacific level, India's collaboration with the U.S, France, Japan, and Australia under the Quad partnership increases information sharing and operational compatibility, particularly in the area of Anti-Submarine Warfare (ASW). On a global level, India's development of submarine capabilities aligns with Western interests in countering China's maritime expansion. However, there is a greater chance of misunderstanding and escalation when there are more deployments in the Indian Ocean Region. The need for discussion on arms control and maritime norms is highlighted by the lack of a strong regional mechanism for fostering confidence-building measures in naval encounters.

Policy Recommendations

According to the above analysis, modernisation is both required and incomplete. India needs to pursue a multifaceted, balanced policy to convert platforms into a credible deterrent posture. Redundancy and patrol rates will increase with improved maintenance pipelines, reserve crew development and accelerated follow-on SSBN construction. Even though building SSBN is costly and time-consuming, investments in crew training and logistics can increase the effective availability of existing naval assets. India needs to improve command and control and secure communication underwater through backup channels as well. A policy initiative that includes joint ventures, predictable procurement schedules and incentives for private-sector suppliers will strengthen supply chains. Reliance on outside vendors is decreased, and upgrades are supported by giving priority to the indigenisation of the critical suppliers. Technical platforms are effective only when combined with doctrine and practice. To increase operational awareness, India may invest in longer crew rotations and realistic ASW and submarine training cycles. Present doctrine does not contain clear guidelines on how the maritime forces must communicate and de-escalate in case of emergencies that may put the risk of making a wrong decision.

Conclusion

India's submarine modernisation program shows both significant strategic progress and persistent operational constraints. The induction of the Arihant-class SSBNs program was a shift in the strategy and introduced a maritime strategic deterrent, thereby strengthening the survivability of its second-strike capability. The induction of Scorpene/Kalvari deliveries has modernised the traditional baselines in India, and Project 75(I) (P-75) will equip next-generation, AIP-powered SSKs that could prove to be game-changers when it comes to endurance at sea[26].

Despite these advancements, the relationship between acquisition and credibility is mediated by the factor of operational considerations, which include the industrial base, crew training, endurance, patrol tempo and maintenance cycles. Despite significant progress in its undersea capabilities, India continues to face challenges in establishing a fully survivable, continuous at-sea deterrent. Logistical limitations, a relatively small SSBN force, and delays in AIP development have constrained this objective. In view of Pakistan's ongoing modernisation, China's expanding maritime presence, and increasingly complex anti-submarine warfare environment in the Indian Ocean Region, addressing these gaps has become strategically important.

Therefore, India's long-term deterrence credibility needs a comprehensive and multifaceted approach. Enhance SSBN sustainment capacity, strengthen the industrial base by involving the public and private partnerships, strengthen doctrine and regional confidence-building initiatives to reduce miscalculation and purchase AIP solutions to seal the endurance gaps as soon as possible. India's silent platforms will be able to count on as reliable guarantors of strategic stability as they will be on the denial instruments in case New Delhi does so in a comprehensive manner. Overall, India's submarine modernisation shows a broader transition from a primarily land-based deterrent towards a more survivable and flexible maritime deterrent capability. It needs continuous support by sustained institutional, technological and operational reforms and then India's submarine force is likely to emerge as a central component of its long-term strategic posture in the Indo-Pacific Region.

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