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Defence Technology and Arms Collaboration: A New Frontier in India–Japan Relations

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Abstract

This paper examines defence technology and arms collaboration as a strategic pillar of India–Japan relations, moving beyond conventional accounts of maritime security and diplomacy. It introduces the concept of a "strategic technology alliance" to capture how middle powers embed cooperation through laboratories, production lines, and innovation ecosystems rather than formal treaties. Drawing on summit declarations, defence strategies, and case studies—including the ShinMaywa US-2 amphibious aircraft, the UNICORN integrated antenna mast, and robotics/UGV projects—the paper highlights both obstacles and breakthroughs. The analysis demonstrates that modular, scalable cooperation and joint R&D embed durable interdependence, positioning technology as a constitutive actor in alliance politics. It concludes that institutionalised dialogues, shared innovation ecosystems, and multilateral frameworks can transform incremental initiatives into a resilient partnership, offering a model of techno-diplomacy suited to a multipolar Indo-Pacific order.

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1. Introduction

The India–Japan relationship has undergone a dramatic transformation over the last two decades, shifting from economic complementarity to a comprehensive strategic partnership. The literature has extensively documented their convergence on maritime security, freedom of navigation, and the institutionalisation of the Quad (Medcalf, 2020) (Basrur & Narayanan Kutty, 2022). Yet one crucial dimension remains insufficiently theorised: defence technology and arms collaboration. Despite policy declarations and incremental progress, this field has been relegated to the margins of both scholarly analysis and policy commentary.

This neglect is puzzling. India is among the world's largest arms importers, long reliant on Russian platforms but increasingly diversifying towards Western suppliers (Wezeman et al., 2023). Japan, constrained for decades by pacifist prohibitions, undertook a landmark policy shift in 2014 with the adoption of the "Three Principles on Transfer of Defense Equipment and Technology" ((*The Three Principles on Transfer of Defense Equipment and Technology*, 2014). In theory, the convergence between India's demand for advanced technology and Japan's cautious emergence as a defence exporter should have generated significant scholarly engagement. Yet, beyond scattered commentary, this domain remains peripheral to mainstream accounts of the bilateral relationship.

This paper seeks to address that gap. It argues that defence technology collaboration constitutes not an adjunct but a strategic pillar of India–Japan relations, embedding trust, building industrial linkages, and forging durable interdependence. More than conventional arms transfers, it is the logic of co-development and technological integration that defines this frontier. To make sense of this shift, the paper introduces the concept of a strategic technology alliance, drawing upon insights from science and technology studies (STS) and middle-power diplomacy. Unlike conventional alliance theories that privilege formal treaties, this approach highlights how states embed cooperation through laboratories, production lines, and innovation ecosystems.

The argument is developed through a qualitative and empirical strategy. It draws on primary sources such as summit declarations, joint communiqués, and official defence strategies between 2014 and 2024. These are complemented by empirical data from arms transfer databases, defence budget allocations, and industrial cooperation projects. Three case studies—the ShinMaywa US-2 amphibious aircraft, the UNICORN integrated antenna mast, and joint robotics/UGV projects—illustrate the promise and pitfalls of this emerging strategic pillar.

By framing India–Japan collaboration through the notion of a strategic technology alliance, the paper advances two contributions. First, it enriches alliance theory by showing how middle powers institutionalise cooperation outside the logic of collective defence treaties. Second, it demonstrates that defence technology is not simply an outcome of security alignments but a constitutive factor in shaping them.

2. Theoretical Framework

Reconsidering Alliance Theory

Much of the canonical literature on alliances views them as responses to external threats, formalised in treaties and sustained by mutual defence commitments. (Walt, 1987) balance-of-threat theory and (Snyder, 1997) account of alliance politics focus heavily on dilemmas of entrapment and abandonment. This perspective illuminates NATO or the U.S.–Japan security treaty but has limited purchase on relationships such as India–Japan, which lack legal defence obligations. Yet to dismiss their strategic alignment as merely rhetorical underplays the structural significance of their cooperation.

Alliance theory, therefore, requires recalibration. Recent scholarship has acknowledged "flexible alignments" (He, 2018) and "coalitions of convenience" (Reichler et al., 2019), but these categories still privilege state-to-state commitments over the material infrastructures that sustain cooperation. By contrast, this paper foregrounds technology as the medium through which states forge durable alignment.

Technology as a Constitutive Actor

STS perspectives offer conceptual leverage here. Technologies are not neutral tools; they structure political relationships and embed interdependencies. (Latour, n.d.) describes artefacts as "missing masses" that shape human networks. (Edgerton, 2007) highlights how technologies, once adopted, reorder economies and institutions. Applied to international security, defence technologies—radars, unmanned systems, aircraft—operate as social artefacts. They demand interoperability, shared protocols, and sustained channels of communication.

India–Japan cooperation illustrates this dynamic. The co-development of robotic navigation algorithms required joint laboratories, exchanges of engineers, and information-security protocols. The UNICORN mast deal demanded industrial integration between NEC and Bharat Electronics Limited. These arrangements create durable ties at the level of institutions and industries, embedding strategic cooperation in ways not captured by conventional alliance theory.

Middle Powers and Technological Diplomacy

India and Japan are often conceptualised as middle powers—states that are not superpowers but wield influence through coalition-building, norm entrepreneurship, and niche capabilities (Beeson & Lee-Brown, 2017). Middle-power scholarship has highlighted their role in maintaining a rules-based order in the Indo-Pacific (Medcalf, 2020) (Mukherjee, 2022). Yet, most accounts still frame their contributions in normative or diplomatic terms.

The notion of a strategic technology alliance extends this debate by positioning technological collaboration as an instrument of middle-power diplomacy. For India, diversification from Russian platforms and indigenisation under *Atmanirbhar Bharat* converge in the pursuit of co-development with trusted partners. For Japan, constrained by demography and budget but rich in technological expertise, external collaboration sustains its defence-industrial base (Hughes, 2017). Together, they enact a form of techno-diplomacy—projecting stability through shared innovation rather than formal defence treaties.

Defining Strategic Technology Alliances

A strategic technology alliance may be defined as a bilateral arrangement wherein states embed cooperation through defence R&D, joint industrial projects, and technological interdependence, without formalising mutual defence obligations. Three features distinguish this model:

1. Embeddedness: Cooperation is institutionalised through working groups, industrial forums, and classified information agreements.
2. Flexibility: Alliances are project-based, scalable, and adjustable without treaty renegotiation.
3. Trust-building: Sharing sensitive technology signals confidence, embedding long-term strategic ties.

The India–Japan case exemplifies this model. Their defence cooperation has progressed slowly but deliberately, privileging modular projects over headline-grabbing treaties. The strategic technology alliance framework thus not only explains their trajectory but also offers a template for understanding how middle powers recalibrate alliances in an era of technological competition.

3. Evolution of the India–Japan Defence Technology Partnership (2014–2024)

Policy Foundations and Historical Trajectory

The institutionalisation of India–Japan defence technology cooperation has been neither sudden nor linear; rather, it has unfolded incrementally against the backdrop of shifting domestic and regional contexts. The decisive turning point occurred in 2014, when Japan formally replaced its restrictive 1967 "Three Principles on Arms Exports" with the more permissive "Three Principles on Transfer of Defense Equipment and Technology." This policy shift allowed Japan to export defence equipment and engage in joint development, subject to strict criteria of transparency, international peace, and contribution to security cooperation (*The Three Principles on Transfer of Defense Equipment and Technology*, 2014).

For India, which had long sought to diversify away from overwhelming dependence on Russian platforms, the Japanese reforms created a unique opening. The Tokyo Declaration of September 2014 between Prime Ministers Abe Shinzo and Narendra Modi elevated ties to a "Special Strategic and Global Partnership," explicitly noting "enormous future potential" in defence technology collaboration. This was followed by the 2015 Agreement Concerning the Transfer of Defense Equipment and Technology and the General Security of Military Information Agreement, which established the legal and institutional foundation for exchanges

of sensitive information and potential co-development projects (*Tokyo Declaration for India - Japan Special Strategic and Global Partnership*, 2014).

The following years witnessed steady consolidation. The inaugural India–Japan Defence Industry Forum in 2017 brought together Japanese manufacturers with Indian public sector undertakings such as Hindustan Aeronautics Limited and Bharat Electronics Limited, as well as emerging private players. In 2019, the two countries inaugurated the 2+2 Ministerial Dialogue, bringing foreign and defence ministers together to oversee cooperation. By 2022, Japan's new National Security Strategy and National Defense Strategy explicitly named India as a priority partner for defence-industrial and technological collaboration (*India-Japan Summit Joint Statement Partnership for a Peaceful, Stable and Prosperous Post-COVID World*, 2022).

This decade-long trajectory reflects how defence technology collaboration has moved from aspirational rhetoric to modest but tangible implementation. It also underscores the importance of leadership continuity. Abe Shinzo played a critical role in initiating defence reforms; Modi's insistence on strategic diversification ensured sustained political will from the Indian side. Subsequent leaders—Suga and Kishida in Japan—maintained this orientation, despite domestic debates on pacifism and arms exports.

Quantitative Trends in Defence Budgets and Trade

Empirical data from defence budgets and arms transfers illustrate the evolving scope of collaboration. India remains among the world's largest arms importers, accounting for 11 per cent of global arms imports between 2018 and 2022. Russia's share of Indian imports declined from 76 per cent in 2009–13 to 45 per cent in 2018–22, while acquisitions from the United States, France, and Israel increased substantially (Wezeman et al., 2023). Although Japanese systems constitute a very small share of India's imports, their qualitative significance lies in the high-end technological niches they represent.

India's defence budget for 2023–24 was INR 5.94 trillion (USD 72.6 billion), with a capital outlay of INR 1.62 trillion and approximately INR 300 billion dedicated to research and development (Ministry of Defence, India, 2023). Japan's defence budget for FY2023 stood at JPY 6.8 trillion (USD 52 billion), a 26 per cent increase over the previous year, reflecting Tokyo's new ambition to double defence spending to 2 per cent of GDP by 2027 (MOD Japan, 2023). Crucially, the Japanese budget prioritised investment in cyber, space, and emerging technologies, creating opportunities for collaboration with India in domains such as artificial intelligence, robotics, and space situational awareness.

Bilateral trade in defence technology remains modest but strategically meaningful. The most notable breakthrough came in 2023, when India agreed to acquire Japan's UNICORN integrated stealth antenna mast for naval frigates. Valued at approximately USD 35 million for initial units, this was Japan's first export of a domestically developed system to India (Takahashi, 2024). While modest in scale compared to India's

deals with the U.S. or France, the transaction was symbolically weighty: it marked the operationalisation of Japan's 2014 export reforms and India's willingness to integrate Japanese technology into its fleet.

Joint research and development projects have also proliferated. Since 2018, the Defence Research and Development Organisation (DRDO) and Japan's Acquisition, Technology and Logistics Agency (ATLA) have collaborated on unmanned ground vehicle navigation systems and counter-drone technologies. Although funding remains relatively small—estimated at USD 10–15 million—these projects represent a crucial mode of cooperation that builds interoperability and trust at the research level rather than through large-scale purchases alone (*Japan & India Initiate a Cooperative Research on Unmanned Ground Vehicles / Robotics | Embassy of Japan in India*, 2018) .

Domestic Political and Bureaucratic Contexts

The pace of India–Japan defence technology cooperation has been shaped not only by external drivers but also by domestic political and bureaucratic contexts. In Japan, constitutional pacifism and public sensitivities towards arms exports continue to impose constraints. Opinion polls regularly show majorities cautious about expanding defence exports, reflecting enduring post-war pacifist identity ("Nearly Half Oppose Japan Exporting Lethal Weapons," 2023). Each export deal requires careful political justification, framed in terms of contributing to peace and stability. Consequently, Japan has adopted a highly selective approach, with India singled out as a trusted democratic partner with convergent strategic interests.

In India, the constraints stem from procurement procedures and industrial policy. New Delhi has consistently linked defence acquisitions to its *Atmanirbhar Bharat* initiative, demanding technology transfer and localised production. While this aligns with the long-term goal of indigenisation, it has complicated negotiations with Japanese firms that remain hesitant to part with proprietary technologies. The stalled ShinMaywa US-2 amphibious aircraft negotiations, which faltered over cost and technology transfer issues, exemplify these tensions.

Despite these challenges, both governments have institutionalised mechanisms to reduce friction. The Defence Industry Forum serves as a clearinghouse for bureaucratic bottlenecks, while the 2+2 dialogue provides high-level political oversight. These structures, combined with leadership-level support, have gradually created momentum.

Strategic Signalling through Documents and Summits

A discursive shift is evident in joint statements and summit declarations over the decade. In 2014–16, references to defence technology were aspirational, highlighting "potential" for cooperation. By 2017–19, statements spoke of "identifying specific projects" and "expanding exchanges between defence industries." After 2020, the tone shifted decisively: the 2022 India–Japan Joint Statement explicitly celebrated the UNICORN transfer and pledged cooperation in "future-oriented domains such as cyber, space, and artificial intelligence" (*Tokyo Declaration for India - Japan Special Strategic and Global Partnership*, 2014) (*India-*

Japan Summit Joint Statement Partnership for a Peaceful, Stable and Prosperous Post-COVID World, 2022)

This gradual progression illustrates how strategic signalling evolved from possibility to practice. Repeated references across summits reinforced expectations and normalised defence technology as part of the bilateral partnership. The process also illustrates the performative dimension of cooperation: even modest projects like UNICORN acquire outsized significance when embedded in a narrative of shared Indo-Pacific responsibility (Takahashi, 2024).

Interim Assessment

Between 2014 and 2024, India–Japan defence technology cooperation has developed from a peripheral aspiration into a modest but durable pillar of the partnership. Quantitatively, the deals remain small compared to India's engagements with the U.S. or France, but qualitatively they represent breakthroughs in Japan's post-war arms export history and India's diversification efforts. Institutionally, agreements on information security and industry forums have created the infrastructure for continued cooperation. Politically, joint statements have routinised the language of collaboration, embedding expectations of progress.

This trajectory confirms the analytical utility of the strategic technology alliance framework. While neither state has formalised mutual defence obligations, their incremental industrial and technological integration demonstrates how middle powers forge durable alignments in a multipolar, competitive regional order.

4. Case Studies in Defence Technology Collaboration

The ShinMaywa US-2 Amphibious Aircraft: Ambition and Deadlock

The proposed acquisition of the ShinMaywa US-2 amphibious aircraft remains one of the most significant yet unresolved episodes in India–Japan defence relations. The US-2, designed for rough-sea landings and short take-off capabilities, was identified by the Indian Navy in 2013–14 as uniquely suited for island surveillance, search-and-rescue, and humanitarian assistance missions in the Andaman and Nicobar Command.

The negotiations carried strategic weight for Tokyo as well. Japan's defence industry had not exported a complete platform since 1945, making the US-2 a potential test case for legitimising its newly reformed arms export policy. Selling to India, a fellow democracy and strategic partner, provided a politically defensible pathway to normalising Japan's role in global arms markets.

However, multiple obstacles derailed the process. Cost was a major factor: estimates ranged from USD 110–133 million per aircraft, significantly higher than alternatives such as the U.S. P-8 Poseidon for maritime surveillance or even smaller European amphibious craft (Wezeman et al., 2023). India's Defence Acquisition Council, under pressure to rationalise spending, baulked at the price. Additionally, India demanded

substantial technology transfer and partial assembly under its *Atmanirbhar Bharat* programme, which ShinMaywa was reluctant to provide. Japanese policymakers also faced domestic resistance. Opinion polls during the 2015–18 negotiations indicated that nearly 60 per cent of Japanese respondents opposed defence exports, reflecting enduring pacifist norms (Envall, 2022).

The US-2 case highlights the difficulties of scaling up to full platform transfers. It illustrates how cost structures, political sensitivities, and industrial protectionism converge to constrain cooperation. Yet paradoxically, the deadlock spurred progress elsewhere: the very effort to pursue the deal pushed both governments to conclude the 2015 Defence Equipment Transfer Agreement and the Information Security Agreement, which remain foundational to subsequent projects.

The UNICORN Integrated Mast: Breakthrough in Modular Naval Cooperation

The successful 2023 agreement on the UNICORN integrated mast system represents the opposite dynamic: a smaller, modular project that overcame bureaucratic and political barriers. Developed by NEC for Japan's Mogami-class frigates, UNICORN integrates radars, communication systems, and electronic warfare sensors into a single stealth-optimised structure. Its advantages lie in reducing radar cross-section and simplifying maintenance, making it attractive to the Indian Navy (Takahashi, 2024).

Valued at approximately USD 35 million for the first systems, the deal was symbolically momentous. It marked Japan's first operational export of a domestically developed defence system to India. Importantly, it tested the mechanisms created by the 2015 agreements on information security and technology transfer. Detailed technical specifications, normally sensitive, were shared between NEC and Bharat Electronics Limited, with oversight by DRDO and ATLA (*Joint Statement*, 2024) (Takahashi, 2024) (Bisht, 2024).

Strategically, the UNICORN project demonstrates the viability of subsystem-level cooperation. Unlike the US-2, UNICORN avoided the cost escalation and political scrutiny that accompany major platform sales. For India, it offered advanced stealth integration at a manageable price. For Japan, it validated the reforms of 2014 and gave its industry an entry point into India's large but highly regulated defence market. Politically, the deal signalled to Beijing and Washington that Indo-Japanese collaboration in defence technology had moved beyond rhetoric to tangible implementation (*Joint Statement*, 2024) (Bisht, 2024).

The UNICORN case underscores the analytical proposition of the "strategic technology alliance." By embedding cooperation through modular projects, India and Japan reduce political risk while gradually building institutional trust. This pathway may be the most sustainable model for bilateral collaboration (Takahashi, 2024).

Robotics and Unmanned Systems: Future-Oriented Collaboration

While US-2 and UNICORN illustrate challenges and breakthroughs in conventional systems, robotics and unmanned technologies highlight the forward-looking dimension of India–Japan cooperation. Since 2018, DRDO and ATLA have collaborated on developing autonomous navigation algorithms for unmanned ground vehicles (UGVs). Though modest in funding (USD 10–15 million), the project has entailed laboratory exchanges, joint testing protocols, and information-security coordination (*Japan & India Initiate a Co-operative Research on Unmanned Ground Vehicles /Robotics | Embassy of Japan in India*, 2018).

The significance of this collaboration lies in embedding research-level cooperation, a domain often neglected in intergovernmental defence partnerships. Unlike procurement, which is transactional, joint R&D fosters habits of trust among scientists and engineers. Moreover, it aligns with global trends: China has dramatically expanded its budget for AI-enabled unmanned systems, while the U.S. has invested heavily in DARPA-led autonomous platforms. For India and Japan, working together offers not only the chance to build niche capabilities but also to participate in norm-setting around responsible uses of autonomy.

Complementarities enhance feasibility. Japan's expertise in robotics hardware, sensors, and miniaturisation aligns with India's strengths in software, data-processing, and operational deployment. This convergence could extend to unmanned aerial vehicles, counter-drone systems, and undersea autonomous platforms—areas explicitly prioritised in Japan's 2022 National Defense Strategy and India's Defence Acquisition Procedure 2020 (Government of Japan, 2022).

Domestic Political and Bureaucratic Dimensions

Each case reveals how domestic political and bureaucratic structures shape outcomes. In Japan, strong pacifist traditions and a legal framework that requires case-by-case vetting of arms exports constrain ambition. Even the UNICORN deal required political justification that it contributed to Indo-Pacific stability (Takahashi, 2024). In India, the Defence Acquisition Procedure mandates offsets and local production, slowing negotiations. Bureaucratic inertia within the Ministry of Defence and DRDO has often made foreign partners wary of engaging deeply.

The US-2 negotiations exposed these tensions most clearly, with Japanese reluctance to transfer technology clashing with India's insistence on localisation. By contrast, the UNICORN case succeeded precisely because it was modular and avoided offset controversies. The UGV collaboration demonstrates how R&D projects can sidestep procurement bottlenecks by embedding cooperation at the research level.

Comparative Indo-Pacific Lens

Situating these cases in comparative perspective further strengthens the analysis. Australia–Japan defence industrial cooperation, despite high political alignment, has struggled with submarine projects due to cost and sovereignty issues (Gady, 2016). South Korea's arms exports to Southeast Asia demonstrate how middle powers use modular subsystems to expand influence without provoking major-power backlash

(Bitzinger, 2017). In this context, India–Japan cooperation follows a hybrid path: ambitious but often stalled platform deals coexist with smaller-scale, feasible subsystem and R&D projects.

This comparison reinforces the paper's central claim: strategic technology alliances among middle powers are most viable when pursued incrementally. Large-scale platform transfers often falter under cost and political constraints, but modular systems and joint research generate durable institutional linkages.

Interim Assessment

Together, the three cases provide a textured picture of India–Japan defence technology cooperation. The US-2 embodies ambition constrained by structural obstacles. UNICORN represents a breakthrough through modular pragmatism. Robotics and unmanned systems highlight the forward-looking, innovation-driven nature of the partnership.

These cases confirm that progress is neither linear nor uniform. Yet, even stalled projects contribute by generating institutional frameworks and political momentum. The strategic technology alliance framework captures this cumulative logic: cooperation is embedded not in treaties but in laboratories, factories, and R&D ecosystems. By 2024, this form of alliance had moved from aspiration to established practice, even if on a modest scale.

5. Drivers, Constraints, and Opportunities

Drivers of Cooperation

The most compelling driver of India–Japan defence technology cooperation lies in their convergent assessment of China. For New Delhi, the 2020 Galwan Valley clash underscored the vulnerability of relying on outdated or imported systems in the face of a peer competitor (Joshi, n.d.). For Tokyo, China's growing assertiveness around the Senkaku/Diaoyu Islands and the Taiwan Strait has heightened urgency for partnerships that enhance deterrence (Green, 2022). In this context, technology-sharing functions as both capacity-building and a diplomatic signal of collective resilience.

A second driver is India's determination to diversify away from Russian platforms. Moscow's invasion of Ukraine and the subsequent sanctions regime exposed the fragility of India's defence procurement model. Russia's share of Indian arms imports dropped from 76 per cent in 2009–13 to 45 per cent in 2018–22, as India expanded purchases from France, Israel, and the United States (Wezeman et al., 2023). Japan, with its advanced technologies and willingness to explore co-development, provides an alternative source that complements India's *Atmanirbhar Bharat* strategy for indigenisation.

From Tokyo's perspective, defence export reform was motivated not only by external threats but also by industrial necessity. Japan's defence firms face declining domestic demand and rising R&D costs. The 2014 export reforms and the 2022 National Security Strategy explicitly encourage partnerships with trusted

states to sustain competitiveness (Government of Japan, 2022). India offers scale, complementary capacities, and a favourable political rationale as a democratic partner.

Finally, the partnership is sustained by convergent strategic visions. India's Act East Policy and Japan's Free and Open Indo-Pacific framework both emphasise multipolarity, connectivity, and stability. Defence technology cooperation gives these visions material substance, demonstrating that they are more than rhetorical constructs (Medcalf, 2020).

Constraints and Challenges

Despite these strong drivers, significant constraints persist. India's defence acquisition system remains slow and bureaucratic. The Defence Acquisition Procedure mandates offsets and prioritises localised production, which often complicates negotiations and discourages foreign suppliers. Bureaucratic rivalries between the Ministry of Defence, DRDO, and the armed services further delay decision-making (Mukherjee, 2022).

Japan, meanwhile, continues to operate under one of the most restrictive export regimes in the developed world. Even after the 2014 reforms, arms exports require case-by-case vetting, parliamentary scrutiny, and political justification as "contributing to peace and stability" (Envall, 2022). Public scepticism towards arms exports remains entrenched, leaving policymakers with limited political capital to pursue large-scale deals.

Industrial divergence adds another layer of friction. Japan's defence sector is dominated by private firms, which are cautious about technology transfer, while India's sector remains heavily state-led, with DRDO and defence public sector undertakings controlling procurement. This mismatch often results in misaligned expectations. Cost is also a constraint: Japan's platforms are typically expensive due to low production runs, while India is highly price-sensitive. The collapse of the ShinMaywa US-2 negotiations illustrates how these divergences undermine ambitious projects.

Finally, geopolitical risks complicate collaboration. India must balance its ties with Russia, which remains a major supplier despite declining share, while Japan must consider Chinese countermeasures and U.S. preferences regarding sensitive technologies. These external pressures act as guardrails, limiting the scope of bilateral cooperation.

Opportunities and Future Pathways

Despite these constraints, substantial opportunities exist. Emerging technology domains—artificial intelligence, cyber defence, space situational awareness, and undersea platforms—offer avenues for co-development. Japan's 2022 Defence Buildup Program prioritises investment in hypersonic defence, unmanned technologies, and electronic warfare (Government of Japan, 2022). India's Defence Acquisition

Procedure also provides pathways for rapid acquisition of disruptive technologies. Collaboration in these areas aligns with both states' strategic priorities and leverages their complementary strengths.

The success of the UNICORN integrated mast underscores the feasibility of modular cooperation. Future opportunities may lie in subsystem-level projects: radar integration, counter-drone technologies, and electronic warfare components. These projects are less politically contentious than full platforms, reduce financial risk, and embed long-term interdependence through industrial cooperation.

India's Defence Industrial Corridors in Uttar Pradesh and Tamil Nadu offer a practical platform for Japanese firms to invest directly, taking advantage of tax incentives and infrastructure. Participation in these ecosystems could institutionalise cooperation and provide Japanese firms with access to India's scale, while helping India meet indigenisation goals.

Finally, multilateral frameworks amplify opportunities. The Quad's Critical and Emerging Technologies (CET) working group already provides a platform for joint initiatives. Trilateral or quadrilateral R&D ventures involving India, Japan, the United States, and Australia could generate greater scale and innovation. Extending subsystem exports to Southeast Asian states would also allow India and Japan to project influence collectively, strengthening their position in regional security architecture without binding themselves in formal alliances (Smith, 2021).

Interim Assessment

The drivers, challenges, and opportunities of India–Japan defence technology cooperation reveal an incremental but cumulative pattern. Shared strategic concerns and convergent visions provide strong incentives, but bureaucratic inertia, restrictive legal frameworks, and geopolitical risks constrain ambition. Opportunities in emerging domains and modular co-development nevertheless point towards a sustainable path forward.

The empirical evidence reinforces the conceptual claim advanced earlier: a strategic technology alliance offers a more accurate framework than traditional alliance theory for understanding India–Japan ties. By embedding cooperation in laboratories, R&D ecosystems, and industrial corridors, both states are crafting a flexible, resilient partnership suited to middle powers in a multipolar Indo-Pacific.

6. Policy Implications and Conclusion

Institutionalising Defence Technology Dialogue

The case studies demonstrate that sensitive negotiations falter when coordination is ad hoc. The ShinMaywa US-2 process was undermined by fragmented bureaucracies and shifting expectations, while the UNICORN mast succeeded precisely because information-security mechanisms were in place. This suggests the need for a dedicated India–Japan Defence Technology Dialogue, distinct from political summits and

general defence forums. Such a body could operate in a manner similar to the U.S.–Japan Defence Technology Forum or the European Union's Permanent Structured Cooperation (PESCO), both of which provide predictability and continuity for cooperative projects. By creating a standing institutional mechanism, India and Japan could reduce the transaction costs of negotiation, accelerate timelines, and depoliticise sensitive exchanges. More importantly, such institutionalisation would operationalise the logic of the strategic technology alliance by embedding cooperation in processes rather than personalities (Mukherjee, 2022).

Prioritising Modular and Scalable Cooperation

The contrast between the US-2 and UNICORN projects highlights the advantages of modular cooperation. Platform-level sales carry prohibitive risks—cost overruns, technology-transfer disputes, and political opposition—whereas subsystem projects are politically more defensible and financially less risky. The UNICORN transfer illustrates how cooperation on smaller, modular technologies can still deliver strategic dividends. For middle powers, this approach is consistent with incrementalism: building trust through smaller steps rather than attempting transformative deals in one stroke (Envall, 2022) (Takahashi, 2024). Policymakers should therefore privilege modular, scalable initiatives in radar integration, counter-drone systems, and electronic warfare. In time, such projects may lay the groundwork for larger ventures, but their immediate value lies in building a track record of success.

Building Shared R&D Ecosystems

The robotics and unmanned systems collaboration illustrates the long-term value of joint research. Unlike procurement, which is transactional, R&D cooperation embeds trust and interoperability among scientists and engineers. Establishing joint laboratories and co-funded research centres in robotics, cyber defence, and artificial intelligence would deepen the technological base of the partnership. Examples from other regions highlight the feasibility of such initiatives: the EU's Framework Programmes for R&D have created cross-border innovation networks despite political divergences. India and Japan could replicate this by pooling resources in emerging technologies, supported by targeted government funding and industrial incentives.

At the same time, R&D ecosystems bring challenges. Issues of intellectual property rights, asymmetric funding capacities, and security sensitivities can create friction. Addressing these requires carefully negotiated agreements on technology sharing and transparent mechanisms for dispute resolution. If these institutional safeguards are put in place, joint R&D could serve as the anchor of the strategic technology alliance, offering a buffer against political fluctuations.

Embedding Cooperation in Multilateral Frameworks

Bilateral initiatives gain resilience when situated in broader architectures. The Quad's Critical and Emerging Technologies (CET) working group offers a natural platform for trilateral or quadrilateral ventures. Embedding India–Japan projects in the Quad would not only provide scale but also distribute costs and reduce political risk. Comparative evidence supports this view: Australia–Japan submarine cooperation fal-

tered partly because it remained bilateral and high-stakes, while South Korea's subsystem exports to Southeast Asia have been more durable due to multilateral supply chains (Bitzinger, 2017).

Expanding subsystem exports jointly to Southeast Asia also represents an opportunity. Supplying radar or counter-drone systems to Vietnam, Indonesia, or the Philippines would reinforce their security while embedding India–Japan cooperation within the wider Indo-Pacific. Such efforts would project collective influence without binding either partner into formal alliances. Over the long term, embedding bilateral projects in minilateral and multilateral frameworks will provide both legitimacy and sustainability.

7. Conclusion

This paper has argued that defence technology and arms collaboration constitute a strategic pillar of India–Japan relations, best conceptualised through the framework of a strategic technology alliance. Unlike traditional alliances based on treaties and collective defence obligations, this model is grounded in modular projects, joint R&D ecosystems, and industrial integration. The empirical evidence from 2014–2024—the stalled US-2, the breakthrough UNICORN mast, and the robotics collaboration—illustrates how middle powers embed strategic trust incrementally through technology.

The policy implications highlight four priorities: institutionalising dialogue, prioritising modular cooperation, building shared R&D ecosystems, and embedding projects in multilateral frameworks. These pathways reflect the central theoretical claim of this paper: that technology functions as a constitutive actor in alliance politics, creating durable interdependencies that supplement or even substitute for formal treaties.

The theoretical contribution of this study lies in bridging alliance theory, middle-power diplomacy, and science and technology studies. Classic alliance frameworks emphasise threat balancing or dilemmas of entrapment and abandonment (Walt, 1987) (Snyder, 1997). Middle-power scholarship highlights coalition-building and norm entrepreneurship (Beeson & Lee-Brown, 2017) but often neglects material-industrial foundations. By introducing the concept of a strategic technology alliance, this paper demonstrates how middle powers institutionalise alignment through laboratories, shipyards, and innovation networks. This model is not confined to India–Japan but has potential explanatory power for similar cases globally.

At the same time, there are limits. India–Japan cooperation benefits from convergent strategic visions and shared democratic values, conditions that may not exist in other contexts. Further research is needed to assess whether this model is replicable elsewhere or whether it is uniquely shaped by Indo-Pacific geopolitics. Comparative studies could explore cases such as EU collaborative defence R&D under PESCO, South Korea–ASEAN arms trade, or Australia–Japan cooperation on submarines. Such work would clarify whether strategic technology alliances are a broader phenomenon of middle-power diplomacy or a regional anomaly.

In sum, India and Japan are not merely procuring systems or co-developing technologies. They are pioneering a model of middle-power techno-diplomacy that may become increasingly relevant in a multipolar world defined by technological competition. If institutionalised and expanded, the India–Japan strategic technology alliance has the potential not only to transform their bilateral partnership but also to reshape the architecture of the Indo-Pacific.

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