



Assessing a Decade of the Sagar Mala Project: Transformation of India's Maritime Infrastructure, Coastal Connectivity and Sustainable Development (2015–2025)

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ABSTRACT

The Sagar Mala Project, launched by the Government of India in 2015, is a flagship initiative aimed at modernizing the country's port infrastructure, enhancing logistics efficiency, and promoting port-led industrialization. Over the past decade, the project has significantly influenced India's maritime sector, reducing logistics costs, improving connectivity, and boosting trade competitiveness. This research paper evaluates the progress, challenges, and economic impact of the Sagar Mala Project, analysing key achievements such as port modernization, coastal economic zones (CEZs), and multi-modal connectivity. The study also discusses prospects and policy recommendations to ensure sustainable growth in India's maritime economy.

KEYWORDS: Blue Economy, Sagar Mala Project, Maritime Trade, soft-infrastructure, Trans-European Transport Network (TEN-T), Maritime Amrit Kaal Vision (MAKV), Harit Sagar.

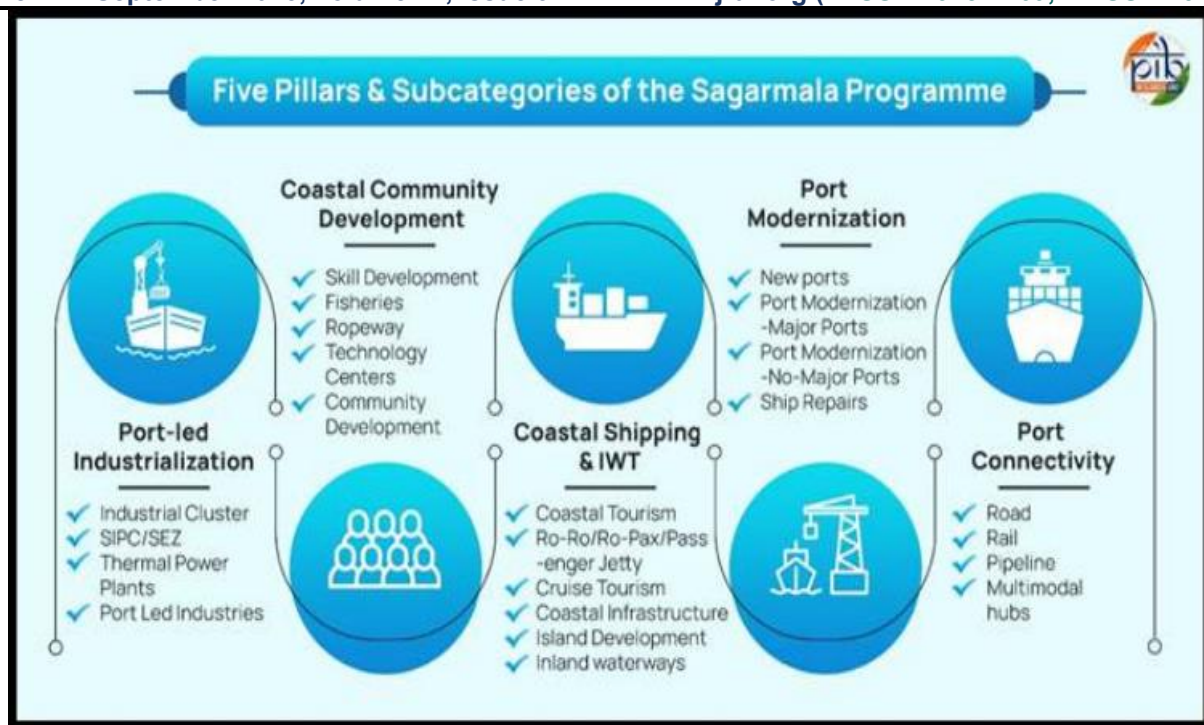
INTRODUCTION

The concept of the "blue economy" has gained significant traction as a dominant paradigm for reconciling the often-competing demands of maritime economic development and oceanic ecological integrity. It represents a shift from viewing the ocean merely as a resource to be extracted to recognizing it as a complex socio-ecological system that generates critical "non-market ecosystem services—such as nutrient cycling, biodiversity preservation, and carbon sequestration" ((UNDP), 2022, p. 5). These services are fundamental to climate regulation and underscore the existential stake in marine health. The economic magnitude of this system is formidable; with an estimated annual value of "\$2.3 trillion," the ocean economy's scale is

comparable to a major national GDP, underpinning the livelihoods of "over three billion people worldwide." ((UNDP)., 2022, p. 7). This framework, therefore, posits that long-term economic security is inextricably linked to the sustainable management of marine resources, making the blue economy not just an environmental concern but a core imperative for global economic stability and equitable development.

For India, the strategic pursuit of a blue economy is not merely an environmental agenda but a fundamental component of its national economic security and developmental ambitions. The sector's substantial contribution of "nearly 4% to GDP" (MoES, 2025, May, p. 15) underscores its macro-economic significance, while its role in supporting "the livelihoods of millions" highlights its profound socio-economic footprint. This dependency is particularly acute in the fisheries sector, where India's position as the "third-largest fish producer globally, contributing 8% of the world's total output" (MoFAHD, 2023) renders it a critical actor in both domestic food security and global food supply chains. Furthermore, the overwhelming reliance on maritime routes, with "95% of India's trade carried by sea," inextricably links the nation's economic stability to the efficiency and security of its port and shipping infrastructure. Given this confluence of economic weight, demographic dependency, and geostrategic trade imperatives, India's extensive coastline and maritime resources represent a critical national asset. Effectively harnessing this potential is therefore pivotal for achieving dual objectives: driving domestic economic growth and fulfilling its commitments to global sustainability frameworks, notably UN SDG 14 (Life Below Water).

Positioned against the imperative of harnessing its blue economy, the Sagar Mala Programme was conceived as India's seminal strategic intervention to catalyse port-led development. The initiative is fundamentally predicated on leveraging the nation's geostrategic assets—a vast coastline, underutilized inland waterways, and a pivotal location on international shipping lanes—to rectify structural inefficiencies, notably high logistics costs, and enhance global trade competitiveness. However, the programme's vision extends beyond mere infrastructural augmentation, explicitly incorporating a mandate for sustainable and inclusive growth. This dual objective necessitates that the pursuit of "rapid economic gains" is consciously balanced with the "long-term health of coastal and marine ecosystems." (MoPSW, 2015 , p. 4). Consequently, the programme's ultimate efficacy is contingent not on the scale of its physical investments alone, but on the more complex challenges of establishing effective governance mechanisms, fostering genuine stakeholder collaboration, and seamlessly integrating sustainability principles into its core operational logic. Sagar Mala thus represents an ambitious and inherently contested endeavour to synchronize economic modernization with ecological and social stewardship.



(Source: PIB)

The formal approval of the Sagar Mala Programme on 25th March 2015 constituted a definitive paradigm shift in India's approach to maritime development. It represented a deliberate departure from the historically "fragmented and sectoral interventions" that had characterized port infrastructure policy, advancing instead a "comprehensive, integrated, and future-oriented programme" (MoPSW, 2015, p. 1) designed to position ports as central catalysts for national economic transformation. The program's strategic logic is spatially explicit, seeking to leverage India's "vast maritime geography—comprising 7,517 kilometres of coastline, 12 major ports, and more than 200 non-major ports" not as isolated terminals, but as interconnected nodes within a broader network of industrial and logistical corridors. This re-conceptualization from ports as standalone infrastructure to engines of "port-led development" is the programme's core structural innovation.

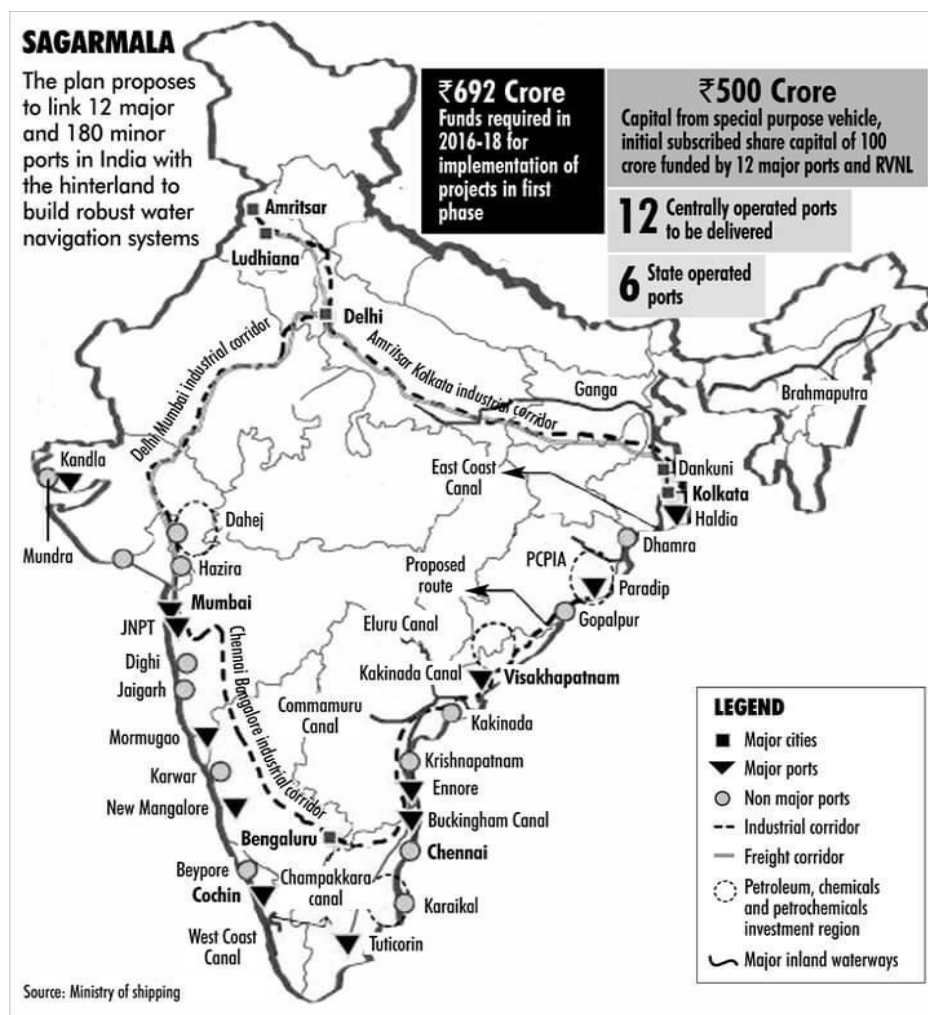
Furthermore, Sagar Mala's conception reflects a conscious emulation of global benchmarks, signalling India's aspirations within the geopolitics of trade. By aligning its vision with large-scale integrative frameworks like China's Maritime Silk Road and the European Union's Trans-European Transport Network (TEN-T), the programme demonstrates an intent to transcend mere infrastructural catch-up. The emphasis on "industrial clustering, seamless multimodal logistics integration, and sustainable port modernization" indicates a strategic ambition to position India competitively within the reconfigured architecture of global supply chains, using maritime policy as a tool of economic statecraft.

The operationalization of Sagar Mala's vision was formalized with the unveiling of the National Perspective Plan (NPP) in April 2016. This document served as the critical strategic blueprint, translating the programme's ambitious goals into a "coordinated national mission" designed to impose "direction and coherence" onto India's historically fragmented maritime initiatives (MoPSW, 2016, p. 3). The NPP's significance lies in its structural framework, which is organized around four interdependent pillars: Port Modernization, Port Connectivity Enhancement, Port-led Industrialization, and Coastal Community Development. This framework

explicitly attempts to integrate hardware (infrastructure), software (logistics efficiency), and hardware (social inclusivity) into a single developmental model.

The inclusion of Coastal Community Development as a foundational pillar is particularly noteworthy, representing a stated commitment to ensuring that the benefits of port-led growth are not concentrated but widely distributed, thereby seeking to "balance growth with inclusivity." (MoPSW, 2016, p. 8). Collectively, the NPP's architecture reflects a holistic understanding that modern port competitiveness is derived not from isolated efficiency but from being embedded within robust industrial and social ecosystems.

In conclusion, the launch of Sagar Mala and its NPP signifies a profound recalibration of India's economic strategy. It embodies an aspiration to move beyond incremental port upgrades and instead leverage the maritime sector as a central driver of national transformation. By explicitly linking infrastructure to industrial policy, trade logistics, and community welfare, the programme is positioned as a transformational project with the potential to reconfigure India's role within global maritime networks, provided its integrated vision can be successfully implemented against the challenges of governance, equity, and sustainability.



Map: Major and Minor Ports under Sagar Mala Project.

2015–16: Early Conceptualization and Pipeline Building¹

The official narrative surrounding the foundational phase of the Sagar Mala Project in 2015-16, as chronicled in government reports, portrays a period of strategic vision and operational groundwork. The Ministry of Ports, Shipping and Waterways (MoPSW) emphasized the establishment of a "robust pipeline of infrastructure projects" and the intent to reposition ports as a "strategic engine for economic transformation." (MoPSW, 2016, p. 5). However, a critical examination reveals that the challenges identified during this inaugural year—particularly land acquisition, Public-Private Partnership (PPP) hesitancy, and institutional fragmentation—proved to be enduring precisely because they were rooted in deep-seated structural and political-economy issues that simplistic policy announcements could not resolve.

The government's framing of land acquisition as a "recurring bottleneck" due to "regulatory hurdles and social sensitivities" (MoPSW, 2016, p. 22) presented the issue as a procedural delay. In reality, independent analyses suggest the problem was far more profound. The policy approach treated land as a mere commodity, failing to engage with the complex political economy of coastal land. (Bose, 2025) The so-called "social sensitivities" were, in fact, legitimate political conflicts arising from the displacement of traditional livelihoods, especially in fishing communities, and the transfer of valuable coastal commons for industrial use. Recommendations for "streamlined clearance mechanisms" addressed administrative speed but ignored the underlying contestation over resources, ensuring the problem would persist.

Similarly, the government's diagnosis of private sector hesitancy focused on technical fixes like revising model concession agreements and offering Viability Gap Funding (VGF) to mitigate "uncertainties in risk allocation" (MoPSW, 2016). While not incorrect, this approach was insufficient. Independent studies pointed to a broader **crisis of institutional trust** (Bank, 2017) that went beyond contract clauses. Investors were wary of regulatory unpredictability, the potential for arbitrary tariff renegotiations, and the historical performance of government partners. By addressing only financial risk, the policy solutions underestimated the need for a transparent and predictable regulatory environment to build long-term confidence.

Furthermore, the project's acclaimed "holistic" vision, exemplified by the inclusion of "Coastal Community Development" as a pillar, masked a critical operational disconnect. On the ground, this pillar remained largely rhetorical. The institutional responsibility for community welfare lay with state-level departments that operated in silos entirely separate from the port authorities and infrastructure ministries driving Sagar Mala. Without effective mechanisms to channel project benefits to local populations, the programme's design perpetuated a **structural divide** between infrastructure goals and social inclusivity, often leading to conflicts that undermined the very development it sought to achieve.

In conclusion, the persistence of these early challenges underscores a fundamental limitation in the programme's initial design. Government reports framed obstacles as technical problems amenable to technical solutions. In reality, they were symptoms of a deeper **governance deficit** involving unresolved federal tensions, inadequate community engagement frameworks, and an underdeveloped regulatory ecosystem. The

¹ Ministry of Ports, Shipping and Waterways, Government of India. (2016). *Annual report 2015-16*. <https://shipmin.gov.in/sites/default/files/2015-16%20English.pdf>

inaugural year of Sagar Mala, therefore, not only set a project trajectory but also revealed the profound difficulty of implementing an integrated vision within a fragmented institutional landscape—a theme that would critically define the programme's entire first decade.

2016–17: Consolidation and Efficiency Gains²

The financial year 2016-17 is often characterized in government reports as a phase of consolidation, where the Sagar Mala programme began translating its framework into actionable projects. Official narratives highlight a strategic pivot towards improving operational efficiency, with a specific focus on reducing vessel turnaround time (TRT) and promoting coastal shipping through schemes like the strengthened Coastal Berth Scheme (MoPSW, 2017). This period saw "encouraging signals" in cargo throughput growth, which was presented as early evidence of the policy's impact, and a growing recognition of the imperative to reduce India's "notoriously high logistics cost—estimated at 13–14% of GDP" (MoPSW, 2017, p. 8).

However, a critical scholarly perspective reveals that this year was less about seamless consolidation and more about an emerging recognition of the programme's fundamental constraints. The focus on TRT, while yielding measurable improvements within port boundaries, inadvertently exposed a critical flaw: the phenomenon of "**contained efficiency**." While official data could show better crane productivity and faster berthing, these gains were often nullified once cargo reached the port gates. The admission that "efficiency gains at ports often dissipated once cargo moved inland" (MoPSW, 2017, p. 8) points to a deeper, systemic failure. The "last-mile connectivity gaps" were not minor impediments but symptomatic of a **structural disconnect** between port modernization and hinterland transportation planning, which remained siloed under different ministries and levels of government.

The government's response—recommending single-window clearances and Port Community Systems (PCS)—again revealed a technocratic bias. These solutions aimed at streamlining information and procedures within the existing bureaucratic framework. Yet, the core challenge of "bureaucratic fragmentation across central and state agencies" was a governance problem rooted in India's federal structure and institutional turf wars, which technological quick-fixes could not overcome. Therefore, 2016-17 represents the point where Sagar Mala's trajectory was set: it would succeed in making visible, isolated improvements at port terminals, but its broader goal of reducing national logistics costs would remain elusive without a more profound, and politically challenging, integration of transport and governance modalities. The year thus marks the transition of Sagar Mala from a visionary project to an institutionalized reform agenda that was now grappling with the immense difficulty of its own holistic ambitions.

² Ministry of Ports, Shipping and Waterways, Government of India. (2017). *Annual report 2016-17*. <https://shipmin.gov.in/sites/default/files/2016-17%20English.pdf>

2017–18: Integration with Inland Waterways and Capacity Ramp-Up³

The year 2017-18 witnessed a strategic recalibration of the Sagar Mala programme, signalling a broader understanding of its objectives. Government reports highlight a pivot towards promoting coastal shipping and inland waterways as "cost-effective and eco-friendly" alternatives to congested road transport, alongside ongoing port modernization efforts (MoPSW, 2018). This shift, coupled with initiatives like revising tariff regulations and establishing port-focused Special Purpose Vehicles (SPVs) for rail connectivity, indicated a growing policy recognition that port efficiency was inextricably linked to a diversified and efficient multimodal transport network. Officially, this period was framed as a move "from a capacity-building approach to a broader logistics paradigm."

However, this strategic broadening also starkly revealed the programme's limitations in tackling deeply entrenched systemic inefficiencies. The persistent reality that "India's logistics costs remained nearly twice that of advanced economies" (MoPSW, 2018, p. 15) served as a glaring counterpoint to the achievements in port-side efficiency. The identified causes—"poor last-mile connectivity, fragmented regulatory oversight, and inadequate institutional coordination"—were not new problems but rather endemic features of India's infrastructure governance landscape. The continued reliance on recommendations to "expedite clearance processes" and "strengthen multi-level coordination" indicated a recurring cycle of identifying the same core governance deficits without deploying the potent political or institutional remedies required to resolve them.

Thus, the "strategic shift" of 2017-18 can be interpreted as an admission that the initial, port-centric model was inadequate. The promotion of waterways and coastal shipping was an attempt to bypass land-based logistical bottlenecks. Yet, this very expansion into new modalities brought its own set of coordination challenges, further complicating the governance puzzle. The year ultimately underscores a critical theme: the programme's ability to conceptualize integrated solutions consistently outpaced its capacity to overcome the fragmented institutional structures necessary for their implementation. The gap between the sophisticated "multi-modal ecosystem" vision and the on-ground reality of "fragmented regulatory oversight" widened even as the policy language became more holistic.

2018–19: Accelerated Modernization and Efficiency Focus⁴

The 2018-19 period is documented in government reports as a pivotal transition for Sagar Mala, where the focus shifted decisively from programme consolidation to delivering measurable operational outcomes. The emphasis on performance metrics, particularly the dramatic improvement in average Turnaround Time (TRT) for major ports from a baseline of "about 107 hours in 2011–12" to "the ~60-hour range" (MoPSW, 2019, p. 12), is highlighted as a key achievement of the modernization agenda. Concurrently, the Draft Tariff Guidelines of 2019 are presented as a landmark regulatory reform, designed to instil investor confidence by

³ Ministry of Ports, Shipping and Waterways. (2018). *Annual report 2017-18*. Government of India. <https://shipmin.gov.in/sites/default/files/2017-18%20English.pdf>

⁴ Ministry of Ports, Shipping and Waterways. (2019). *Annual report 2018-19*. Government of India. <https://shipmin.gov.in/sites/default/files/1405631573Anuleng.pdf>

moving towards "flexible benchmarking and commercial freedom" (MoPSW, 2019, p. 28). Officially, this phase marked Sagar Mala's evolution into a "productivity-oriented regime."

A critical analysis, however, suggests that these significant *internal* port efficiencies created a misleading mirage of holistic progress. The phenomenon of "**contained efficiency**" became starkly evident. While investments in "digitized gate systems and enhanced crane productivity" yielded impressive TRT figures within the port's boundaries, these gains were systematically diluted by "persistent weaknesses in evacuation infrastructure." The fact that "limited rail sidings, poor access roads, and inadequate ICD connectivity" continued to throttle cargo movement beyond the port gates revealed a critical disconnect. The programme had successfully optimized the node but failed to rectify the broken links in the broader logistics chain. This resulted in a scenario where ports appeared globally competitive on specific metrics, yet India's overall logistics costs remained disproportionately high.

Furthermore, the juxtaposition of the progressive Tariff Guidelines with "tariff uncertainty" as an ongoing challenge underscores the implementation lag and persistent trust deficit that plague the Public-Private Partnership (PPP) ecosystem. The policy recommendations to "front-load capital expenditure on connectivity" were an explicit admission that the internal efficiency gains were unsustainable without complementary external investments. Thus, from a scholarly perspective, 2018-19 represents the stage where Sagar Mala's core contradiction became institutionalized: the ability to deliver world-class efficiency within a confined space, while remaining constrained by a landscape of infrastructural and governance failures that it lacked the jurisdictional power to overcome. The programme had become productivity-oriented, but its productivity was fundamentally contained.

2019–20: Trade Diversification amid Global Headwinds⁵

The pre-pandemic year 2019-20 served as a critical stress test for the Sagar Mala programme, exposing its limits in resilience in the face of global volatility. Official accounts from the Ministry of Ports, Shipping and Waterways (MoPSW) rightly highlight the "throughput resilience" demonstrated at major ports like JNPT, where earlier investments in mechanization and digital workflows helped maintain operational stability amidst "global trade headwinds" (MoPSW, 2020, p. 9). The policy response, which "leaned heavily into digitalization" through PCS upgrades and EDI integration, is presented as a strategic adaptation to enhance predictability.

However, a scholarly interrogation of this period reveals that the external shocks did not create new problems but rather illuminated pre-existing, deep-seated vulnerabilities in India's port-led development model. The core lesson of 2019-20 was the stark confirmation of **uneven resilience**. The fact that only ports with "integrated gate-to-hinterland solutions and robust digital pipelines" could effectively weather the volatility underscores that the efficiency gains of previous years were not systemic. Ports that functioned as modernized but isolated nodes remained highly susceptible to supply chain disruptions, ultimately transferring "volatility

⁵ Ministry of Ports, Shipping and Waterways. (2020). *Shipping annual report* [Annual report 2019-2020]. Government of India. https://shipmin.gov.in/sites/default/files/Shipping%20Annual%20Report%20English_compressed.pdf

costs to shippers" and the broader economy. This experience validated the critique that Sagar Mala's success had been geographically and functionally patchy.

The renewed emphasis on "regulatory and risk allocation clarity" as being "as essential as capital expenditure" was a tacit admission that the programme's financial sustainability was fragile. The global slowdown likely exacerbated the "tariff uncertainty" that had plagued PPPs, demonstrating that investor confidence was as vulnerable to external shocks as physical infrastructure. Consequently, the recommended priorities—diversification of cargo and hinterland links—were not novel insights but a belated recognition that the initial, throughput-centric model was inadequate for a volatile global economy. In essence, 2019-20 exposed that the programme had built pockets of excellence but had not yet constructed a resilient, integrated maritime logistics ecosystem capable of absorbing exogenous shocks. The year highlighted that true competitiveness required a foundational shift from optimizing individual ports to fortifying the entire national logistics network against systemic risks.

2020–21: Pandemic Resilience and Recovery⁶

The COVID-19 pandemic during the 2020-21 financial year acted as an unplanned, real-time stress test, forcing an accelerated adaptation within India's maritime sector that official reports frame as a demonstration of "strong operational resilience." MoPSW data highlighting that "non-major ports accounted for nearly 46% of cargo flows" (MoPSW, 2021, p. 17) is correctly cited as evidence of how decentralized capacity enhanced system-wide shock absorption. The crisis precipitated significant institutional shifts, most notably the Ministry's reconstitution and the pivotal decision to align Sagar Mala with the PM Gati Shakti framework, marking a critical, crisis-driven acknowledgement that siloed planning was untenable.

From a scholarly perspective, however, the pandemic's primary function was to brutally expose the underlying fragilities that years of incremental reform had failed to address. The rapid adoption of "bio-safety protocols, and pilot contactless gate systems" was less an innovation and more a stark revelation of the sector's over-reliance on manual, contact-intensive processes. The "bottlenecks in labour-intensive activities such as stevedoring and hinterland trucking" that emerged were not caused by the pandemic but were pre-existing weaknesses that the crisis simply laid bare. This period thus exemplifies **crisis-driven institutional learning**, where long-advocated digital and multimodal solutions were finally prioritized out of necessity rather than strategic foresight.

The alignment with Gati Shakti was the most significant outcome, representing a belated recognition of a truth the pandemic made inescapable: a port's efficiency is meaningless if the supply chains it connects to are broken. The "lasting structural gains" mentioned in policy documents would require moving beyond the emergency fixes of 2020-21 to tackle the perennial challenges of "hinterland connectivity" and "workforce upskilling." Therefore, 2020-21 should be interpreted not simply as a story of resilience, but as a moment of forced clarity. The pandemic did not create new challenges; it amplified pre-existing systemic failures,

⁶ Ministry of Ports, Shipping and Waterways. (2021). *Annual report 2020-21*. Government of India. https://shipmin.gov.in/sites/default/files/AnnualReport2021_0.pdf

creating a window of political and institutional opportunity for the integrated planning that Sagar Mala had always required but had thus far failed to fully implement.

2021–22: Gati Shakti Alignment and Organizational Restructuring⁷

The 2021-22 fiscal year is officially characterized as a period of post-pandemic consolidation and a strategic pivot, marked by the explicit alignment of Sagar Mala with the PM Gati Shakti National Master Plan. This integration signified a fundamental philosophical shift from executing isolated port projects to planning "cross-modal corridor development driven by a unified digital planning stack". (MoPSW, 2022, p. 5) Operationally, strong recovery metrics, such as a "~10.3%" rise in cargo handled and a continued decline in turnaround time to "about 54.1 hours" (MoPSW, 2022, p. 8), are presented as evidence that previous capacity and efficiency investments were yielding tangible, system-level benefits. Institutionally, the formation of the Sagar Mala Development Company aimed to sharpen the focus on project delivery.

A critical analysis, however, suggests that this year was defined by the formidable challenge of translating the new "systems thinking" paradigm into actionable reality. The very need to create new institutions and digital platforms was an implicit admission that the existing governance structures were inadequate for the integrated approach Sagar Mala now professed. While policy attention rightly concentrated on "first- and last-mile connectivity," the persistence of "protracted land clearances, inter-agency coordination bottlenecks... and financing frictions" revealed a deep implementation chasm. The Gati Shakti alignment provided a superior planning tool, but it did not automatically resolve the entrenched political and bureaucratic fragmentation that had historically crippled multi-agency projects.

Therefore, from a scholarly viewpoint, 2021-22 represents the year Sagar Mala confronted its own institutional legacy. The programme successfully embraced a systems-oriented vision, but its ability to execute this vision remained constrained by the very "persistent constraints" it sought to overcome. The emphasis on "fast-tracked statutory clearances" and "strengthened state-centre coordination" was a repetition of long-standing recommendations, indicating that the new masterplan had yet to dismantle the old obstacles. The groundwork was laid for future transitions, but the central paradox endured: the scale of the administrative and federal cooperation required for true integration was, and remains, the programme's most significant and unresolved hurdle. The systems were being designed, but the institutional will and capability to operate them seamlessly were still in development.

2022–23: Coastal and Green Transition⁸

The fiscal year 2022-23 represented a significant qualitative expansion of Sagar Mala's agenda, marking a deliberate pivot towards integrating sustainability and enhanced governance into the core of India's maritime strategy. This shift was symbolized by two key developments: the operationalization of the Major Port Authorities Act (2021) and the initiation of formal "green shipping norms." The Act, which granted major

⁷ Ministry of Ports, Shipping and Waterways. (2022). *Annual report 2021-22* [Annual report]. Government of India. <https://shipmin.gov.in/sites/default/files/Annual%20Report%202021-22%20%28ENGLISH%29.pdf>

⁸ Ministry of Ports, Shipping and Waterways. (2023). *Annual report 2022-23*. Government of India. <https://shipmin.gov.in/sites/default/files/Annual%20Report%202022-23%20English.pdf>

ports greater autonomy as landlord entities, was a crucial governance reform aimed at improving operational flexibility and "catalysing PPP confidence" by aligning with global standards (MoPSW, 2023, p. 15). Concurrently, the drafting of emission benchmarks signalled an intent to reconcile port-led growth with environmental stewardship, creating a framework where "decarbonization and digitalization" were pursued in tandem.

However, a critical examination reveals that this year highlighted a new dimension of the programme's core challenge: the gap between policy ambition and implementation capacity. The Major Port Authorities Act empowered individual ports, but it did not automatically resolve the larger, systemic issue of coordinating between these newly autonomous ports, state governments, and multiple central ministries for hinterland connectivity—a persistent bottleneck for "smaller coastal ports." Similarly, the introduction of "carbon intensity reduction targets" and "green shipping norms" unveiled a new set of structural hurdles, primarily concerning "technological readiness and financial support." The policy prescriptions for a "green shipping roadmap" and "fiscal incentives" acknowledged these barriers but remained at a conceptual level, failing to address the significant capital investment and technological transfer required for meaningful decarbonization, especially for smaller, resource-constrained ports.

Thus, for scholars, 2022-23 is not merely a story of expanded scope but an inflection point where Sagar Mala's challenges became more complex. The programme successfully embedded sustainability and governance modernization into its official discourse, moving beyond a purely throughput-centric model. Yet, it simultaneously inherited a new suite of implementation dilemmas. The risk emerged of creating a **two-tier maritime system**: a few large, modernized major ports capable of meeting green and digital benchmarks, and a long tail of smaller ports struggling with basic infrastructure and connectivity. The year, therefore, reflects the programme's attempt to reconcile growth with stewardship, but it also underscores that this reconciliation would be fraught with financial, technological, and coordinative complexities that mirror the earlier struggles with physical infrastructure integration.

2023–24: Harit Sagar and Green Ecosystem Building⁹

The fiscal year 2023-24 is officially marked as the period of institutionalizing India's green maritime transition, primarily through the adoption of the Harit Sagar Guidelines. These guidelines, alongside symbolic initiatives like the Green Tug Transition Programme, represent a strategic effort to embed "measurable standards for port decarbonization, energy efficiency, and circular economy practices" (MoPSW, 2024, p. 22) into the sector's regulatory framework. This integration of environmental metrics with operational performance, coupled with a new focus on "skill ecosystem development," signifies a mature policy recognition that long-term competitiveness is inextricably linked to sustainability and a future-ready workforce.

⁹ Ministry of Ports, Shipping and Waterways. (2024). *Annual report 2023-24*. Government of India. https://shipmin.gov.in/sites/default/files/Annual%20Report%202023-24_English.pdf

A critical scholarly analysis, however, suggests that this "green inflection point" simultaneously unveiled profound new implementation challenges and potential inequities. The promotion of "shore power systems, LNG bunkering stations, and hybrid retrofits" as pilot projects starkly highlighted the issue of **differential capacity**. The admission that "green retrofits and OPS demanded high upfront capital, and port-level grid readiness was uneven across states" points to a significant risk of creating a **two-tier maritime system**. Well-funded major ports may successfully transition, while smaller, non-major ports—often in less developed states—could be left behind due to financial and infrastructural constraints, exacerbating existing regional disparities.

Furthermore, the policy prescriptions, such as the call for "green viability gap funding (VGF)" and "innovative financial mechanisms," acknowledge the financial barrier but remain aspirational. They reveal a familiar pattern: the articulation of a sophisticated goal (a green transition) without a fully articulated, scalable financing and implementation strategy that addresses the uneven developmental landscape of Indian ports. The focus on skill development is a positive step, but it also underscores how the technological demands of the green and digital shift could outpace the current capabilities of the workforce. Therefore, 2023-24 should be read not just as a year of integration, but as the moment Sagar Mala's challenges evolved from those of physical connectivity and bureaucratic coordination to those of **financial inclusivity and equitable technological diffusion** in its next phase of development. The environmental commitment was mainstreamed, but the pathway to achieving it equitably remains fraught with unresolved economic and structural tensions.

2024–25: Maritime Amrit Kaal Vision (MAKV) 2047 and Digital Transformation¹⁰

The fiscal year 2024-25 represents the culmination of Sagar Mala's first decade, framing the programme within the long-term horizon of the Maritime Amrit Kaal Vision (MAKV) 2047. This strategic embedding signifies the programme's evolution from a targeted infrastructure initiative into a comprehensive, **holistic maritime development strategy** explicitly aiming to balance "growth, sustainability, technological transformation, and community empowerment" (MoPSW, 2025, p. 5). The intellectual shift towards "deep decarbonization, AI/blockchain-based digital twins, and resilient infrastructure planning" demonstrates an ambitious, forward-looking agenda that seeks to position India at the forefront of the global maritime sector.

From a critical scholarly perspective, however, this culmination is not of a completed transformation, but of an increasingly complex and daunting set of interdependencies. The very expansion of the programme's scope to include frontier technologies and climate resilience has magnified the fundamental challenges that have persisted since its inception. The identification of "prohibitive" adoption costs for AI and blockchain for smaller ports, coupled with a "talent gap," starkly illustrates that the programme's advanced goals are susceptible to creating a new, **technological and cognitive divide**. This risk exacerbates the existing regional and infrastructural disparities, potentially leaving a significant portion of India's port ecosystem unable to participate in the envisioned high-tech, sustainable future.

¹⁰ Ministry of Ports, Shipping and Waterways. (2025). *Annual report 2024-25*. Government of India. <https://shipmin.gov.in/sites/default/files/Annual%20Report%202024-25%20-%20English.pdf>

Furthermore, the recognition of "climate change risks—particularly sea-level rise" as an "urgent policy concern" introduces an external, non-negotiable variable that transcends the programme's original focus on efficiency and cost reduction. The recommendations for "massive skill development programmes" and "climate adaptation blueprints" are acknowledgements of the colossal implementation gap that now exists between the visionary goals of MAKV 2047 and the current on-ground capabilities and vulnerabilities. Therefore, 2024-25 marks a transition from a project grappling with **physical and bureaucratic silos** to one now confronting **technological, financial, and environmental imperatives**. The first decade succeeded in establishing a broad strategic framework; the second decade's success will hinge on developing feasible, equitable, and resilient mechanisms to implement it against a backdrop of even greater complexity.

POLICY FRAMEWORK AND PROGRAMME DYNAMICS IN THE MARITIME SECTOR

The recent flurry of maritime initiatives signifies a strategic consolidation of India's decade-long Sagar Mala vision, simultaneously advancing domestic modernization and asserting a more ambitious global role. Domestically, policy is increasingly characterized by a **technological and green inflection**, exemplified by the launch of India's first indigenous hydrogen fuel cell vessel and the 'Harit Nauka' guidelines targeting a full green transition for inland vessels by 2047. These measures, coupled with productivity-linked rewards for port workers, aim to enhance both the sustainability and operational efficiency of the maritime ecosystem.

Concurrently, India is leveraging this domestic progress for strategic geopolitical gains. The landmark agreement with the UAE on the India-Middle East-Europe Economic Corridor (IMEC) and the finalization of the long-term Chabahar port contract with Iran are not mere infrastructure projects but clear instruments of **maritime diplomacy**. They are designed to position India as a critical node in alternative global supply chains, reducing strategic dependencies and enhancing its influence across the Indo-Pacific and West Asia. This dual focus—internal green-technology modernization and external strategic corridor development—alongside its re-election to the IMO Council, underscores India's intent to transition from a regional maritime power to a significant rule-shaping actor in the global maritime order.

ECONOMIC DIMENSIONS OF MARITIME DEVELOPMENT

The past decade has witnessed the strategic reanimation of India's inland waterways, transitioning them from neglected channels into a calculated component of the national logistics framework. This shift is quantified by a nearly sevenfold increase in freight volume, from 18.1 MMT in FY 2013-14 to 145.5 MMT in FY 2024-25, a growth trajectory that underscores a deliberate policy push to capitalize on water transport's cost and environmental advantages (MoPSW, 2024). This expansion is not merely a statistical achievement but represents a critical step towards realizing a multimodal logistics system capable of reducing the country's crippling logistics costs.

This progress has been driven by targeted interventions. The Cargo Promotion Scheme, with its 35% incentive, functions as a market-correcting mechanism to artificially stimulate demand and "institutionalize cargo traffic" on key routes, demonstrating a state-led approach to building a nascent industry. Significantly, the integration of the Indo-Bangladesh Protocol Route elevates the waterways from a domestic project to a tool of **regional**

economic integration, strengthening cross-border supply chains with Bangladesh. Institutionally, the convening of the first Inland Waterways Development Council and the massive ₹45,000 crore investment pledge signal a maturation of governance, aiming to diversify the economic base of waterways beyond freight to include tourism, thereby enhancing their commercial viability. Collectively, these measures reflect a long-term vision to transform rivers into multifunctional corridors that balance commerce, sustainability, and strategic regional connectivity. However, the reliance on substantial subsidies highlights that the sector's economic self-sustainability remains a future goal rather than a present reality.

INFRASTRUCTURE AND CONNECTIVITY GAINS

The past decade has unequivocally marked a period of quantitative and qualitative transformation within India's port sector, driven by the strategic imperatives of the Sagar Mala programme. The cornerstone of this shift is a massive expansion of infrastructure, with the cargo handling capacity of major ports more than doubling from 800.5 MTPA in 2014 to 1,630 MTPA by 2024, ambitions further extended by visionary targets exceeding 10,000 MTPA by 2047 (MoPSW, 2024). This capacity-driven growth has been matched by a rigorous focus on operational efficiency, as evidenced by key performance indicators: the average vessel turnaround time has been nearly halved to 48.06 hours, and dwell time has been reduced to 2.6 days, metrics that are now competitive with global benchmarks.

The success of this modernization agenda is externally validated by India's improved standing in international indices. The rise of ten Indian ports into the World Bank's Top 100 Container Ports and the country's ascent in the Logistics Performance Index from 54th to 38th position are not merely symbolic achievements (Pib, 2024). They signal a tangible enhancement in the reliability and competitiveness of Indian ports, which is crucial for attracting global trade flows. These gains are the direct result of completed modernization projects, technological adoption, and procedural reforms that have collectively enhanced ship berth-day output by 52% and cargo handling efficiency by 87% since 2014-15.

In essence, the decade has successfully repositioned Indian ports from being infrastructural bottlenecks to becoming dynamic engines of trade. The transformative journey is clear: through concerted investment and efficiency reforms, the sector has solidified its role as a crucial driver of domestic growth and is now poised as an increasingly integral node within reconfigured global supply chains. However, this success story primarily reflects optimization *within* port boundaries; the next decade's challenge lies in seamlessly integrating these efficient nodes with the wider hinterland to achieve a truly transformative reduction in end-to-end logistics costs.

TRANSFORMATIONAL ROADBLOCKS

A critical assessment of Sagar Mala's first decade reveals that its transformative potential has been significantly constrained by a complex of structural, institutional, and socio-environmental deficits that are deeply embedded in India's governance landscape. The programme's implementation has been persistently hampered by a **governance trilemma**: the overlapping jurisdictions of central, state, and port authorities create debilitating coordination failures; ambiguities in Public-Private Partnership (PPP) frameworks foster

investor uncertainty; and procedural bottlenecks in land acquisition and clearances lead to extensive delays and cost overruns. These are not mere operational hiccups but symptoms of a fundamental institutional architecture that is misaligned with the programme's integrated ambitions.

This governance deficit is compounded by a critical **infrastructural disconnect**. The significant capacity and efficiency gains achieved *within* port boundaries—the halving of turnaround times, for instance—are systematically diluted by the persistent inadequacy of hinterland connectivity. Congested rail and road networks act as a throttle, ensuring that the benefits of port modernization rarely translate into seamless end-to-end logistics efficiency. Furthermore, the programme's socio-environmental pillars, particularly coastal community development, have remained largely rhetorical. Environmental Impact Assessments (EIAs) are often perfunctory, and the displacement of fishing communities underscores a significant gap between the policy's inclusive aims and its on-ground outcomes, which often prioritize industrial expansion over ecological and social stewardship.

Financially, the reliance on private investment has been undermined by the very risks the governance structure fails to mitigate, while geopolitically, Sagar Mala operates in a contested Indian Ocean Region, necessitating a strategic calculus that extends beyond economic development. Collectively, these challenges indicate that the programme's vision of port-led development has been hindered not by a lack of ambition, but by the absence of a concomitant **governance overhaul**. Unless these foundational issues of inter-agency coordination, credible community engagement, and strategic hinterland integration are addressed, Sagar Mala's promise may culminate in creating efficient ports as isolated islands of excellence, rather than catalysing the holistic coastal economic transformation it originally envisioned.

POLICY RECOMMENDATIONS

The proposed policy interventions for Sagar Mala's second decade present a technically coherent but politically naive roadmap. While recommendations for a single-window clearance system, enhanced viability gap funding, and digital-green integration logically address known bottlenecks, they fundamentally misdiagnose the programme's core constraint. The persistent failure to implement similar prescriptions over the past decade reveals that the primary barriers are not technical but rooted in India's deep-seated governance fragmentation. A "single-window" cannot resolve inter-agency turf wars or federal complexities, just as subsidizing private investment through VGF cannot compensate for the underlying lack of bankable projects and regulatory predictability that deter capital. These solutions treat symptoms while ignoring the disease: an institutional architecture fundamentally misaligned with the programme's integrated ambitions.

Furthermore, the technological and social prescriptions risk perpetuating the very inequities they seek to resolve. The push for AI, blockchain, and green shipping, without mechanisms for equitable diffusion, will likely create a two-tier maritime system, widening the gap between advanced mega-ports and resource-poor regional ports. Similarly, linking skill development to community benefit is an inadequate response to the socio-economic disruptions of port-led industrialization. Training programs cannot guarantee inclusion if the new industries generated are capital-intensive rather than labour-absorbing. Ultimately, without a concomitant political commitment to overhaul governance structures and enforce equitable benefit-sharing, these

technically sound recommendations risk repeating the first decade's cycle of isolated achievements and partially realized transformation.

CONCLUSION

The Sagar Mala Project represents a definitive inflection point in India's maritime history, marking a successful transition from a legacy of fragmented port management to an integrated, strategic vision for a modern blue economy. Over its first decade, the programme has delivered transformative outcomes: the doubling of port capacity, the dramatic improvement of operational efficiencies, and the strategic activation of inland waterways have collectively enhanced India's logistics backbone and solidified its role as a key Indo-Pacific maritime hub.

Looking ahead, Sagar Mala's foundational achievements provide a robust platform for its next phase. The ongoing integration of green technologies, digital systems, and community-centric initiatives demonstrates an evolving model of development that seeks to harmonize economic ambition with ecological and social responsibility. By building upon this decade of infrastructure and institutional learning, Sagar Mala is poised to mature from a national infrastructure programme into a comprehensive strategic framework—one that enables India to champion the development of resilient, sustainable, and interconnected maritime corridors well into the 21st century.

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