RIS Discussion Paper # 318

Tokenisation of Maritime Assets: Solutions for Fractional Ship Owning

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Abstract: India's expanding role in the global economy highlights a significant opportunity to strengthen its maritime sector, particularly in shipbuilding and ship owning. Since 2000, its share of global exports and imports have increased by more than twofold and threefold, respectively, amid a falling share in global registered tonnage. This presents a pressing need for acquiring additional ships for the transportation of EXIM and coastal cargo, fleet replacement needs, and the transition to green shipping commensurate with global standards, which requires a capital investment of nearly INR 15-16 lakh crores (at present prices). However, existing shipping finance models are complex, involve numerous intermediaries and stringent mortgage conditions. Subsidies by government, though encouraging, can not be a long term practice. As a result, a key challenge for India's shipbuilding and ship-owning sector is the identification of innovative financing alternatives.

The discussion paper proposes leveraging tokenisation of real-world assets as an emerging technology that enables fractional ownership of physical assets through the digital representation of ownership rights on a distributed ledger technology, facilitated by blockchain. It outlines the procedural framework for tokenising of ships, along with associated regulatory and compliance requirements, to pitch value proposition for key stakeholders. Further, it recommends the establishment of an Expert Committee or Task Force to facilitate, oversee, and regulate ship tokenisation, to enhance national shipping tonnage and promote shipbuilding and shipowning through secure, trustworthy, and transparent transactions using digital ledgers.

Keywords: Tokenisation, fractional ownership, shipbulding, ship owning, Ship finance.

Introduction

Maritime Trade and Shipbuilding

As per the estimates of the United Nations Conference on Trade and Development (UNCTAD) global sea-borne trade accounts for a colossal market value of US$ 380 billion in freight rates.[1] This trade is carried

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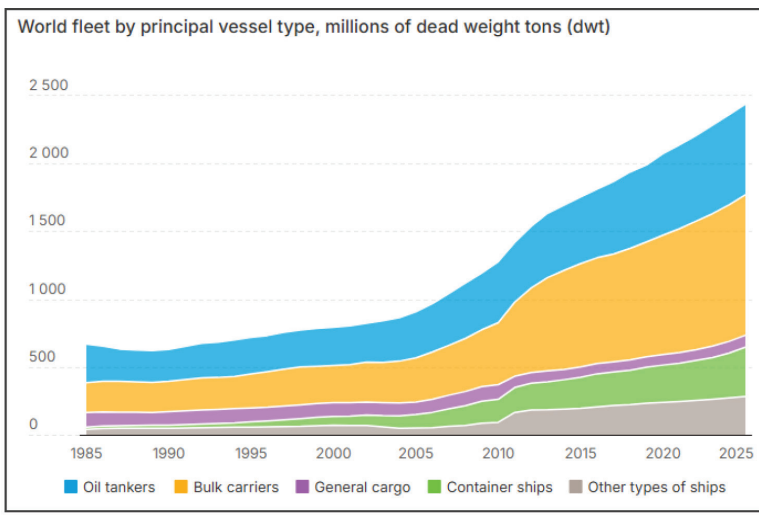
by bulk carriers, container ships, oil, gas, and chemical tankers, ferries, and passenger ships, which are all, built in shipyards. In addition to such commercial ships, warships, military vessels, research and survey ships, and offshore platforms are also built in shipyards. Therefore, shipbuilding is indeed a 'strategic industry' not only in terms of world trade but also as the facilitator for market access to merchandise, and for national security. The global shipbuilding market was valued at US$ 162.14 billion in 2024 and is projected to reach US$ 228.82 billion by 2032, growing at a Compound Annual Growth Rate (CAGR) of 4.4 per cent,[2] sailing on a growing global trade and anchored on industry demands for decarbonization and sustainable ships. The world fleet by deadweight tonnage (DWT) has grown five-fold in 40 years and three-fold in twenty years as shown in Figure 1.[3]

Figure 1: World Merchant Fleet, 1985-2025



Source: UN Trade and Development, UNCTADstat and Clarkson's research.

The shipbuilding industry is highly capital-intensive and requires substantial funding, raw materials, diverse equipment, and skill intensive management and labor. It entails long gestation periods during which capital remains invested with no returns. Revenues

accrue only after vessels are completed and charters are concluded. Also, it faces uncertainties such as volatile freight rates, and fuel costs, faces international regulations imposed by the International Maritime Organization (IMO), like Carbon Intensity Indicator (CII) and Energy Efficiency Existing Ship Index (EEXI), requiring expensive retrofits to existing fleets.[4] Therefore, for financiers, insurers, charterers, shipyards, and shipping companies, shipbuilding is a highly speculative business with great upside growth but at some downside risk due to turbulence in this cyclic industry. Consequently, financing of ships becomes a highly specialized business, different from other and more predictable asset-based industries such as real estate.

Ship finance is a broader term encompassing financing shipping companies (to acquire ships, refinance existing debt, and working capital requirements), and also shipyards (maintaining working capital before delivering orders and receiving full payments).[5] Ship finance has an international character as it transcends across multiple jurisdictions as ships ply across the global commons, are owned by financiers, shipowners and charterers based in different countries but may also fly the flag of yet another state which cumulatively require enforceable secure investments across various legal structures. These factors combine to make cross-border ship financing uniquely challenging.

For ship mortgage, the International Convention on Maritime Liens and Mortgages 1993[6] provides an agreed approach to the registration and priority of ship mortgages, ensuring that these instruments are recognized and enforceable in the contracting states thus offering certainty and protection for financiers.

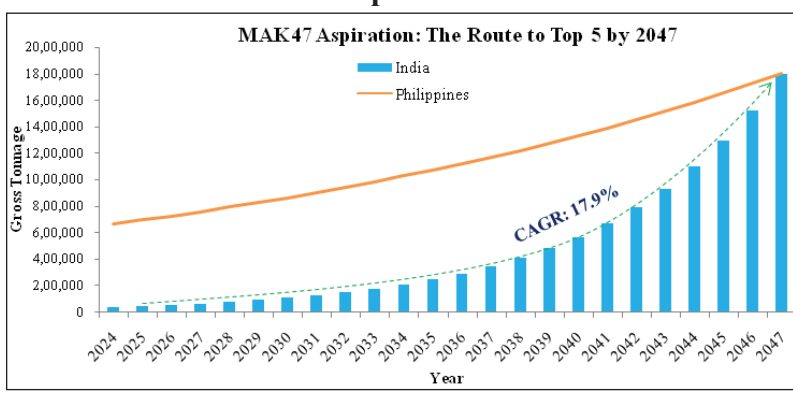
Typically, funds for shipbuilding or even ship owning are raised through two ways. First, through 'Equity' which could be Owner Equity, Private Equity, Limited Partnerships, and Public Offerings. Second, raising 'Debt' through Loans, Bonds, and Leasing. Governments also frequently provide funds by offering low-cost financing through grants, and subsidies to revive and sustain the industry as a strategic investment in the national interest.

Ship Owning in India – Challenges and Solutions

In 2025, India's share in global shipbuilding was 0.06 per cent.[7] However, India has a rich heritage in shipbuilding and has globally recognized credentials in building complex warships and submarines. Recognizing the importance of the shipping sector, the Ministry of Ports, Shipping, and Waterways (MoPSW) prepared the Maritime Amrit Kaal Vision Document 2047 (MAKV47) in 2023. The document outlines key themes for advancing the shipping sector in pursuit of the Viksit Bharat 2047 vision and highlights the challenges that must be addressed for India to be among the top 5 shipbuilding nations by 2047.[8]

Currently, the Philippines holds the 5th position in global shipbuilding, with an annual output of 668,207 Gross Tonnage (GT) with a market share of about 1 per cent while India ranks 17th, contributing 40,923 GT[9] with a market share of 0.06 percent. Assuming, Philippines continues to grow at the global CAGR of 4.4 per cent[10] India would need to annually deliver 1.8 million GT by 2047 to replace the Philippines as the 5th largest shipbuilder, growing at a CAGR of 17.9 per cent as shown in Figure 2. Even then, it would only improve global market share from 0.06 per cent to about 0.9 per cent.

Figure 2: Roadmap to Replace Philippines as 5th Largest Shipbuilder



Source: Author's Calculation.

The MAKV47 document highlights that Indian shipyards face a cost disadvantage compared to foreign counterparts due to high financing costs, long trade cycles that drive up working capital needs, and limited capital availability to expand their product range.[11] Since shipping is a demand-driven industry, a study at the Research and Information System for Developing Economies, New Delhi (RIS), was conducted to assess vessel requirements, the associated capital outlay, and a shipbuilding plan was developed to realize the MAKV47 aspiration. In brief, the build plan targets the markets as shown in Table 1. It also shows the number of vessels required in each segment and the expected capital outlay (For details, see Appendix A). Going forward, India will need more funds to imbibe high-technology SMART (Systems Materials, Automation, Robotics Technologies) shipbuilding.

Table 1: India's Estimated Capital Requirement by Type of Vessel Market

Type of Vessel Market	No. of Vessels	Capital Expenditure (INR crore)
Replacement Fleet	631	48,000
Coastal Fleet	334	84,000
EXIM Fleet	2,894	13,88,889

Source: Author's Calculations.

Realizing this potential, the Government of India undertook several initiatives, including the Ship Building Financial Assistance policy (SBFAS), 2016-2026, but the scheme could not generate the desired results. In September 2025, the government announced a comprehensive shipping package of INR 69,725 crore, including the extension of SBFAS until 2036 (INR 24,736 crore), Maritime Development Fund (INR 25,000 crore), and Shipbuilding Development Scheme (INR 19,989 crore).[12]

As derived from Appendix A, the estimated capital requirements of about INR 15-16 lakh crore clearly shows that Government funding alone and subsidies are not equal to the task. Banks, in India, are reluctant to invest in the sector due to the risks, and if the loan facility is indeed available, the rate of interest charged is very high (averaging 10-15 per

cent per annum with lower tenures of 5-7 years) for shipping companies to service this debt. Regulations under the Basel IV norms further complicate bank lending as higher capital adequacy ratios constrain their ability to lend to a high-risk sector. Sustainability considerations have also become more prevalent in bank lending, particularly with the adoption of the Poseidon Principles[13] which already has incorporated 35 signatories, representing approximately US$ 240 million in ship finance. A OECD[14] report, 'An Analysis of Market-Distorting Factors in Shipbuilding - the Role of Government Interventions,' pointed out that government incentives may not always work on expected lines of providing a level playing field to market participants.

The current shipping finance models are complex, involving numerous intermediaries and mortgage conditions. Debt financing places strain on operating cash flows, equity financing reduces managerial autonomy, and leasing arrangements often restrict operational flexibility. This presents a pressing need for arranging low-cost and long-term capital for energising the shipbuilding sector in India. The capital must be easily available as shipyards need flexibility and timely working capital to build a ship, and shipowners need capital to refinance their debt and acquire new vessels. Consequently, the core challenge is to identify alternative models to finance this shipbuilding requirement.

Therefore, the discussion paper proposes leveraging modern fintech instruments, most notably, tokenisation, which can provide low-cost funding through fractional ownership of the underlying asset (the vessel represented through a Special Purpose Vehicle (SPV)) by converting asset ownership into unique digital tokens to enable participation of retail investors with lower investment capacity, and thus liquidate otherwise illiquid assets through easier and faster trading of tokens in the secondary market. This approach is expected to finance shipbuilding through organic growth of the domestic industry as well as inorganic ship ownership through the acquisition of pre–owned ships from the global market without involving numerous intermediaries.

Alternative Finance – Tokenisation

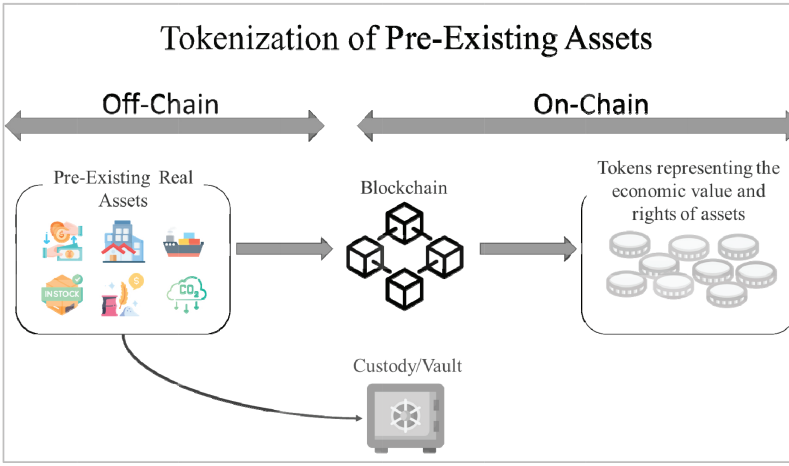
Definition

A report by the Financial Stability Board[15] explains tokenisation as *'the process of using emerging technologies, such as distributed ledger technology (DLT) enabled through blockchain, to issue or represent assets in digital form as tokens'.* Any Real World Asset (RWA) - ranging from financial assets such as equities, fixed-income securities, and bank deposits to non-financial or physical assets, including art, real estate, commodities, and precious stones - can be tokenized. Each token is unique and represents a certain value (e.g., a claim on or digitized version of a real or financial asset) that can be legally issued, stored, operationally exchanged, or tracked securely on a programmable ledger[16] that is the DLT. It enables a lawful interest or share in the asset but in a digital form governed by transparent code and regulation. For instance, the Dubai Land Development authority has launched the first city-wide tokenized real-estate investment project, 'PRYPCO Mint' platform, which enables token holders to own a share of a prime real estate project in Dubai and generate returns.[17]

Tokenisation procedure can be totally 'on-chain', or hybrid - 'on-chain' and 'off-chain.'[18] Tokens can be created in two ways: either as native tokens,[19] issued directly and exclusively on DLT, or as asset-backed tokens,[20] that is, digital representations of physical or existing assets that were originally issued outside the DLT environment. Therefore, some tokens represent existing assets while, others create entirely new assets that establish a claim against the issuer.

This paper discusses the feasibility of tokenisation of maritime assets, specifically ships. Hence, the focus is only on asset-backed tokens or RWA Tokenisation, which represents an asset that exist 'off-chain.' When real (physical) assets are represented on DLT, their economic value and rights gets conventionally linked or embedded into DLT-based tokens, which serve as a store of value. Here, the tokens function as a digital twin 'on-chain,' while the underlying real assets continue to exist in the 'off-chain' world, as shown in Figure 3.[21] This allows for fractional ownership of the asset, unlocks liquidity, ensures clear traceability, and facilitates auditability.

Figure 3: Digital Representation of Physical Assets on DLT



Source: Authors Representation.

Important Attributes for Asset Tokenisation

The important attributes for asset tokenisation are outlined below[22]:-

a. *Asset definition*. Specify the underlying asset, issuer details, unique identifiers, available quantity, and characteristics essential for valuation, accounting, and trading.

b. *Embedded rights*. Details legal and economic entitlements granted to the token holder, such as dividend payouts, voting participation, redemption capabilities, or charter payments (in case the ship is the underlying asset).

c. *Provenance.* Provides a transparent, tamper-proof, and auditable record of the token's origin, transaction history, and previous ownership – all of which can be accessible only to authorized viewers or can be publicly viewable.

d. *Ownership Status*. Accurately represents current holders or custodians of the token, including explicit claims or encumbrance on the underlying asset.

e. *Compliance Rules*. Encodes compliance requirements, regulatory conditions, and jurisdiction-specific rules directly into the token, enforcing rules, governing transferability, trading eligibility, and legal adherence.

f. *Clearing and Settlement.* Post-trade settlement through an automated DLT application of tokenized assets is made available through either wholesale Central Bank Digital Currency (wCBDC), stablecoins, or by making the DLT framework interoperable (composability) with the existing payment infrastructures.[23]

g. *Banking Framework.* For seamless asset trading, a strong banking foundation is essential, with domestic digital or tokenized currency as the ideal baseline.[24]

Potential Roles and Structures in Asset Tokenisation

The implementation of tokenisation will generate new roles within the market ecosystem, as mentioned below[25]:-

a. *New Market Structures.* Token issuers and developers (tokenisation agents) design and manage tokenized assets, ensure compliance, and maintain the underlying DLT platforms.

b. *Digital Asset Custodians.* This provide secure cryptographic keys and provide institutional-grade custody to safe keep reference assets.

c. *Digital-native Service Providers.* On-chain identity providers, support identity verification.

d. *Interoperability Providers.* Make programmable ledgers and conventional systems compatible.

e. *Node Operators.* Provide transaction validation and update the ledger.

f. *Key Management Providers*. Secure tokenized assets.

g. *Smart Contract Auditors*. Ensure contract integrity, safety, and verifiability.

h. *Oracles.* Collect data and store it on DLT platforms, such that the data can be used for smart contracts.

i. *Ramps.* Facilitate the exchange of assets in traditional financial structures with assets on DLT platforms.[26]

j. *Transfer Agent.* Maintain precise records of token ownership and safeguard the integrity of all token transfers.

k. *Validators Network.* Authenticate and validate blockchain transactions, ensuring the system's security, accuracy, and trustworthiness.[27]

Operationalising the DLT Platform for Asset Tokenisation

The DLT platform could be operationalized under three models[28]:-

a. *Public Permissionless*. Open, decentralized networks that allow anyone to participate, transact, and validate transactions without requiring prior authorization, limiting the default privacy.
b. *Public Permissioned*. Networks restricted to selected, vetted participants-typically regulated entities-that combine decentralization with controlled governance, ensuring transparency, high performance, and regulatory compliance.
c. *Private Permissioned*. Fully centralized networks with access limited to pre-approved participants-designed for high performance, confidentiality, regulatory compliance, and internal institutional applications.

For example, ERC3643[29] is a permissioned token standard for RWA tokenisation, ensuring only eligible investors can hold and transfer tokens (Details in Appendix B).

Maritime Asset Tokenisation

Maritime tokenisation is the process of 'converting ownership rights in physical maritime assets — such as ships, ports, or cargo — into digital tokens on a blockchain'. Each token represents a fractional share of the asset, allowing investors to participate in maritime investments without owning the entire asset. Once the asset is tokenized, ownership records are stored on a decentralized ledger, thus, reducing fraud risks. Investors can buy, sell, or trade these tokens, like stocks or real estate investment trusts (REITs), providing liquidity in an industry traditionally known for its capital-intensive and illiquid nature.

Applying the concept to maritime physical assets, *"ship tokenisation refers to the process of converting ownership and operational rights of a vessel into a digital token on a blockchain."*[30] The gross registered tonnage (GRT) of the vessel could be converted into equivalent tokens. For example, a ship with a GRT of 12,000 (existing in the 'off-chain' realm), will have 12,000 equivalent tokens representing its value and rights (existing on the 'on-chain' ledger). In this structure, owning one

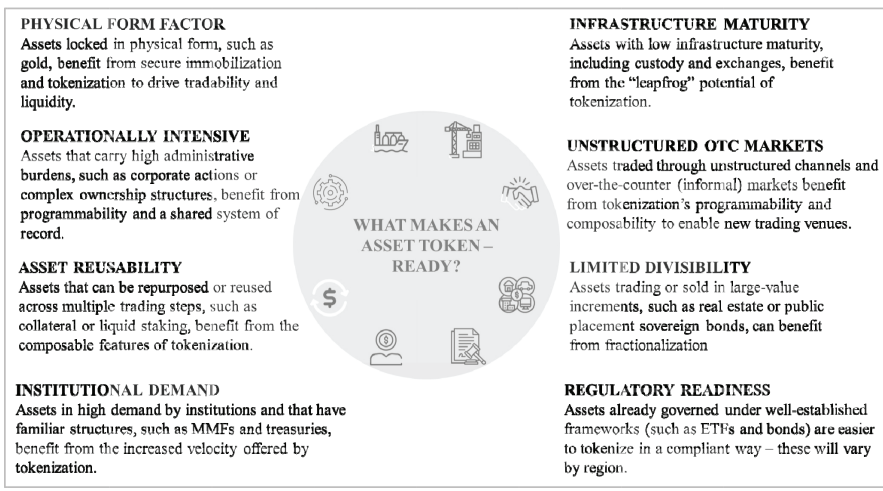
token would correspond to owning 1/12,000th of the ship's value or rights.

The *Howey Test*[31] prescribed criteria for a transaction to qualify for an 'investment contract *as a deal where someone invests money in a common venture expecting profits mainly from someone else's efforts*.' The ship tokenisation exercise involves investment of money (including digital currency), in a common enterprise (SPV representing a vessel), with expectation of profits (ownership entitlement, revenue from operations) to be derived from the efforts of others (SPV is owned by shipping company and vessels are managed by shipowners or charterers). Therefore, tokenisation converts ships into investable instruments. Hence it meets the Howey test and therefore qualifies as a security.

Tokenisation Traits and Shipbuilding/Shipowning

To further examine the suitability of ships to be tokenized recourse has been taken off the World Economic Forum[32] report that describes eight key traits that determine whether an asset is suitable for tokenisation (Figure 4). These attributes have been examined briefly in the context of ships to assess their suitability for tokenisation.

Figure 4: WEF - Tokenisation-Ready Traits for an Asset



Source: World Economic Forum.

a. *Physical Form Factor*. Ships are tangible assets that can be tokenized on DLTs, benefiting from secure immobilization, (Secure immobilisation is the physical and legal restriction of a real-world asset under regulated custody, ensuring that digital tokens issued against it are fully backed, non-duplicable, and legally enforceable) tradability, and liquidity, and hence are compliant with the requirement.
b. *Operationally Intensive*. With multiple entities involved in ship operations and their regulations, it is a complex business where programmability can help maintain a single record system through smart contracts.
c. *Asset Reusability.* Ships can be used as collateral or liquid staking,[33] benefiting from the composability (interoperability) of tokens.
d. *Institutional Demand.* Ships are the backbone of international seaborne trade, thus have high institutional demand, but high capital requirement often becomes an entry barrier for investor with low capital and less risk taking capacity.
e. *Infrastructure Maturity.* Ship tokenisation is an emerging fintech, which is yet to see widespread adoption; hence, infrastructure maturity is low.
f. *Unstructured Over-The-Counter (OTC) Market.* Ship sales today often take place through private negotiations, brokers, and OTC deals, which are fragmented, opaque, and highly relationship-driven. Prices, terms, and ownership details are not always transparent, making it difficult for smaller players to participate. Tokenisation would enable trading on new structured digital marketplaces.
g. *Limited Divisibility*. At present, investors can only redeem their capital by selling an entire vessel, which makes ships a highly illiquid asset class. Through fractional ownership, investors could instead liquidate portions of their holdings via secondary marketplaces, enabling quicker and more flexible redemption.
h. *Regulatory Readiness*. Shipping finance models currently work on well-established traditional frameworks, regulations, and laws

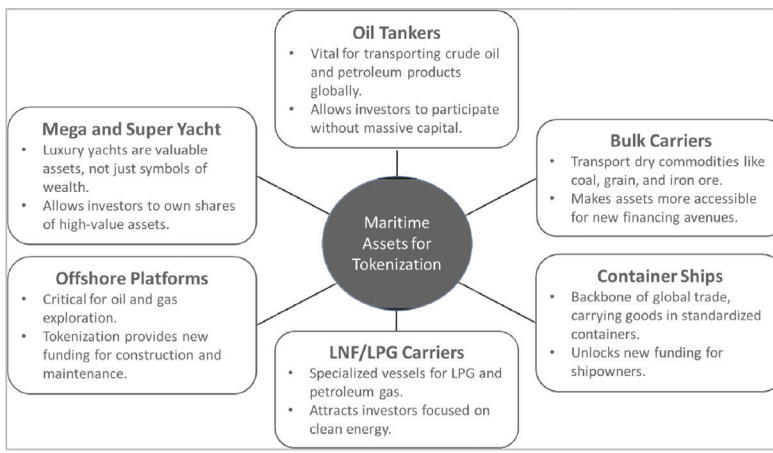
exist for RWA tokenisation under various jurisdictions; therefore, ships present a case point for asset based tokenisation.

i. *Wide Investor Base.* Tokenisation will enable retail investors to participate in an asset class that is traditionally held by large financial institutions, shipowners, etc. thus opening new investment avenues for the investors with varying investment capacities.

Compatible Ships for Asset Tokenisation

Figure 5[34] illustrates the various types of ships that are suitable for asset based tokenisation. The underlying principle of fractional ownership remains the same. However, the revenue recognition model may need to be customized to specific vessel types and the specific business operations, such as time charter, voyage charter, and cost heads, such as crew compensation, routine, and temporary repairs, and 'fit for purpose' cargo holds, port fees, etc.

Figure 5: Categories of Maritime Assets for Tokenisation



***Source*:** Antier Solution

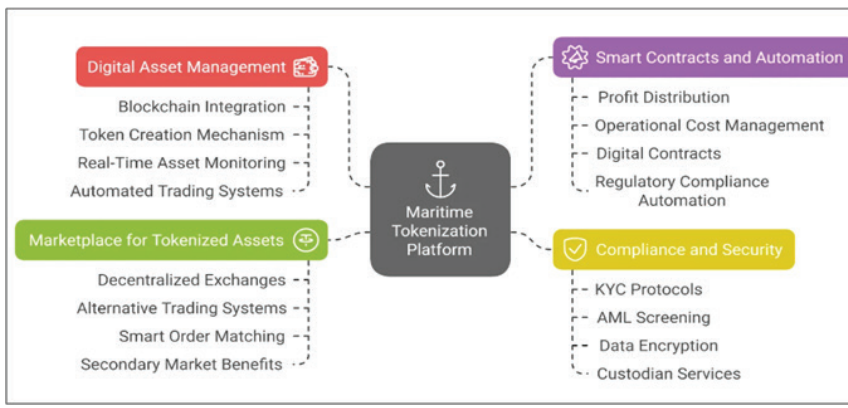
Key Components of a Trusted Ship Tokenisation Platform

Figure 6[35] summarizes the key components required to create a trustworthy and high-performing ship tokenisation platform.

A robust digital asset management framework should support the issuance, trading, and tracking of maritime tokens through blockchain integration, token creation mechanisms, real-time asset monitoring, and automated trading systems. Smart contracts are the most crucial part of tokenisation. Compliance through Know Your Customer (KYC), and Anti Money Laundering (AML), and reliable data encryption, along with custodian services to prevent illicit access, and the elimination of counterfeit token issues is essential to safeguard the interests of stakeholders.

The presence of Decentralized Exchanges (DEXs),[36] Alternative Trading Systems (ATS),[37] smart order matching, and secondary markets provides transparent pricing through real-time tracking and expands the investor base across the markets, ensuring the success of tokenisation in the shipping industry.

Figure 6: Key Components of a Maritime Tokenisation Platform

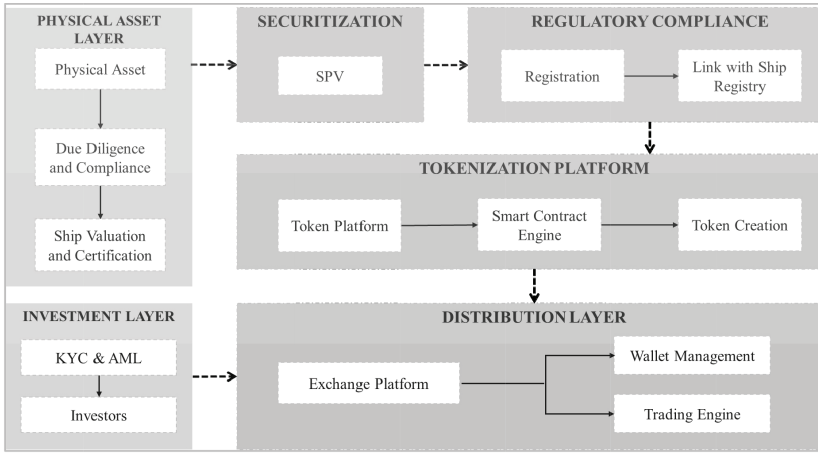


***Source*:** Coinmonks

Architecture for Ship Tokenisation

Figure 7 describes how asset tokenisation works with ships as the underlying asset and is discussed briefly in the following paragraphs.

Figure 7: Ship's RWA Tokenisation Architecture



***Source*:** Author's Compilation.

Physical Asset Layer (Off-chain). This comprise:-

a. *Physical Asset*. The initial step is to select a vessel for tokenisation. This vessel is then 'issued' on a ledger supporting blockchain. This does not involve creating a new asset, but rather creating a digital representation of an existing tangible asset, that is, the ship.[38]

b. *Regulatory Adherence.* Due diligence must be conducted to create a legal entity with clearly defined ownership details, rights, and obligations for all parties, ensuring legal compliance and an investment entity structure legally enforceable in the respective jurisdiction.

c. *Asset Value*. It is crucial to define how the underlying vessel is valued. This means determining the method or process used to assess its market value. Proper valuation is essential to establish trust in the tokenized asset and ensure that the tokens accurately represent a proportional share of the asset's value. Shipbrokers, class societies, and insurers help determine the ship's value depending upon conditions such as, vessel's physical condition, and operating profile.

Securitization (Off-Chain). After identifying the vessel that is to be tokenized, the shipping company incorporates a SPV, which holds 100 per cent ownership and operational rights of that vessel. The SPV is the issuer of the tokens.[39]

Regulatory Compliance (Off-Chain and On-Chain). These include:-

a. *Registration*. The SPV must register with the recognized regulator/authority overseeing the tokenisation procedure as per the law in the respective jurisdiction.
b. *Link with the Ship Registry*. The SPV must also register with the ship registry to establish a legal connection between the physical asset (vessel) and its digital representation. Ship registries should be integrated with the blockchain DLT to mirror the details of tokenized ships, ensuring each tokenized vessel has a verifiable digital footprint linked to its official registry entry.

Tokenisation Platform (On-Chain). The tokens, issued by SPV using a blockchain platform, are the digital representation of the vessel.

a. *Token Platform.* Establishment of a token platform, which is the core system responsible for managing the entire process of tokenizing assets, provides the infrastructure for converting vessels into digital tokens on the blockchain, supported by DLT.
b. *Smart Contracts (Programmability)*. They are self-executing agreements whose terms are directly embedded in code. They record the day-to-day operations of the tokenized vessel and transactions impacting their value, automatically enforce and carry out the contract when predefined conditions are met (known as atomic settlement), removing the need for intermediaries. These contracts ensure that the asset behaves transparently, exactly as defined by the issuer and regulator, without human interference.
c. *Token Creation.* It involves:-
    i. *Token configuration*. It is done to set parameters, rights, and compliance rules.

ii. *Token Minting*. It refers to the process when the token is created to represent asset ownership.

Investment Layer (Off-Chain). This step involves selecting the investors eligible to invest in the asset, such as retail or institutional investors. The selection criteria must be clearly defined, and a thorough KYC and AML process is necessary to be conducted following the legal and compliance requirements set by the regulatory authorities.

Distribution Layer (On-Chain). After token creation on the selected vessel and the implementation of smart contracts, distributors undergo KYC and AML verification. Once on board, the token is listed on a blockchain-based trading platform, enabling seamless token trading.

a. *Exchange Platform*. An exchange platform (or specialized investment platform) is created to list the tokens, acting as a gateway between issuers (those creating tokens) and investors/ traders (those transacting tokens).
b. *Wallet Management*. Tokens are stored in regulated digital wallets that require cryptographic keys for access, to ensure that only the rightful owner can access and transfer tokens. Wallets can be custodial (managed by the platform) or non-custodial (controlled by the user).
c. *Trading Engine.* The trading engine is the core system that matches buy and sell orders in real-time based on supply and demand dynamics.

Post-trade Revenue Distribution (On-Chain). The distribution of charter income or profits flows automatically to token holders through smart contracts. Any sale, mortgage, or title change in the real world is reflected digitally ‘on-chain'. Ship’s income stream could be derived in two ways:-

a. *Intrinsic Value*. Ship, being a tangible asset, possesses an inherent value subject to depreciation over time. However, its value can also appreciate if demand for that specific ship type rises, as ship supply is inelastic in the short term.

b. Operational Income. Ships earn revenue through charters and leasing, which depends upon the cargo carrying capacity represented by its certified Net Tonnage, productivity, and freight rates.[40]

Taxation. Investment income is subject to taxes as per the judicial jurisdiction and regulatory compliance such as Tax Deduction at Source (TDS) or Tax Collection at Source (TCS) and Goods and Service Taxes, as applicable and need to be programmed for both investment and income channels.

The Mass Appeal of Tokenisation. The primary goal of tokenisation is to enable fractional ownership and enhance liquidity in shipping finance by the seamless buying and selling of digital tokens via an easily accessible digital marketplace. Moreover, tokenisation provides an efficient mechanism for raising capital to fund initiatives such as green retrofits, supported by a wider and more diverse investor base.[41] The tokenisation asset system offers several benefits over the traditional asset system, as mentioned in Table 2, and is poised to generate mass appeal as an investment pathway for transparent and trustworthy transactions.

Table 2: Tokenisation vs. Traditional Finance

Parameter	Traditional Asset System	Tokenized Asset System
Accessibility	Limited to large investors	Fractional access—anyone can invest, democratizing investment in true sense
Verification Process	Manual verification, slow transfers	Instant verification, automated settlement
Investment Liquidity	Opaque and often illiquid	Transparent, auditable, and tradable
Intermediary Dependence	High, required for every function	Low, most enabled through smart contracts
Transaction Cost	High due to multiple intermediaries	Low
Immutability & Auditability	Difficult to maintain	Blockchain ensures tamper-proof ledger

***Source*:** Author's Compilation.

Value Proposition. The value proposition from tokenizing ships for various stakeholders can be construed to be as follows:-

a. *Shipowners*. It provides diversified, flexible, faster, low-cost access to capital, allowing direct raise from a global investor base and reduce dependence on a few financial institutions and private investors that charge high interest rates and often constrain operational autonomy. Traditional funding reduces ownership control for ship-owners, but with tokenisation, they can retain full strategic control over the vessel. This can also spur innovation, as shipowners can undertake projects previously thought to be unattainable due to a lack of financing.

b. *Shipbuilders*. Funds for working capital are readily available, reducing payment default risk and stabilizing their cash flows, which increases orders for new ships, enhancing capacity utilization.

c. *Investors.* It will open new avenues for investment, specifically for retail investors, with a role in the uninterrupted flow of international trade. Vessels are high-value assets with an operational life of 20-30 years, so they can provide long-term passive returns from charter revenues. Moreover, the investors are exposed only to the risks related to the specific ship whose tokens they own, rather than the entire shipping company. Their investment is affected by company-related risks only if those risks directly impact the tokenized ship. This structure not only hedges investors from idiosyncratic risks but also minimizes the impact of systematic risk by isolating it from unrelated factors affecting the broader shipping industry.

d. *Governments*. A boost in the maritime sector generates employment, facilitates financial inclusion, spurs fintech innovation, enhances strategic autonomy by becoming self-reliant in shipbuilding, and ultimately contributes to GDP growth.

Risks. However, every financial product involves certain risks as highlighted in a report by the Financial Stability Board.[42] Some pointers

for policy makers in risk identification and mitigation are as mentioned below:-

a. *Compliance with anti-money laundering and countering the financing of terrorism regulations*. Tokenisation is still at a nascent stage, and the regulations are not yet clearly defined at the country level as well as the global level, which can aggravate regulatory arbitrage due to inconsistency.

b. *Potential Operational risks*. Digitalization can expose investors to cyber-attacks.

c. *Settlement Asset*. When investors redeem their investments, the settlement asset in the form of central bank money must be available. The DLT platform must be interoperable with traditional systems to incorporate existing payment systems.

Another report by OECD,[43] 'Regulatory Approaches to the Tokenisation of Assets,' has also raised potential risks of tokenisation as brought out below:-

a. DLT-based atomic settlement might eliminate 'netting of trading',[44] increasing the need to prefund the account for trade to occur, as cash and tokens must be available transaction-by-transaction. Consequently, an increase in liquidity requirements might make tokenisation unattractive to some financial market participants.

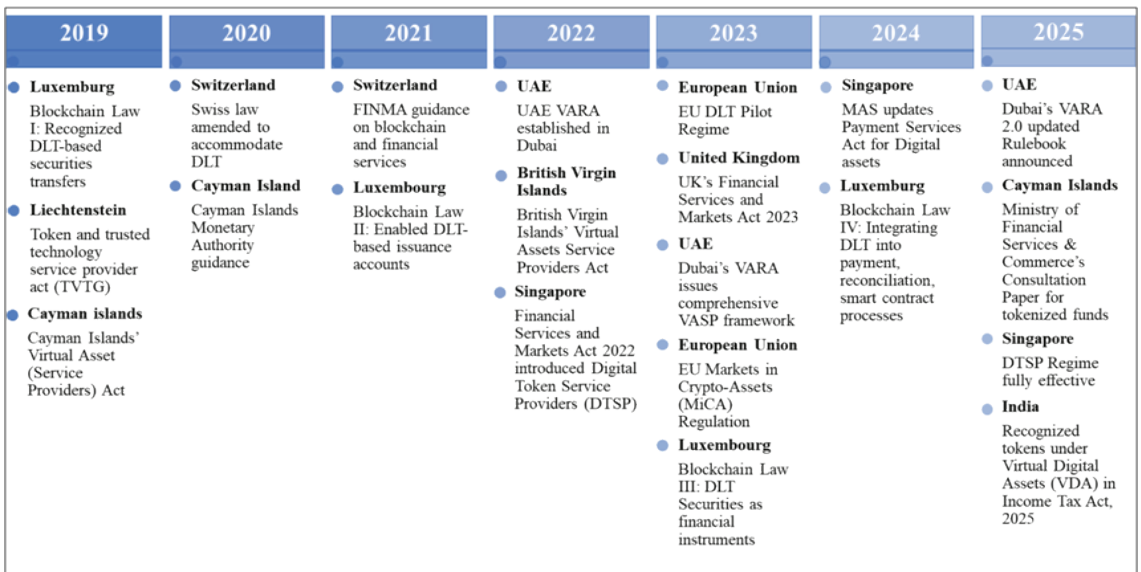
b. Custodians of physical assets, such as ships, neither hold the asset directly nor can they demonstrate exclusive ownership, making it challenging to evidence the existence of the tokenized security for regulatory books and records and hence the ship registry eco-system and the token need to be closely intertwined.

c. Lack of cooperation agreements across states can challenge the enforceability of smart contracts between jurisdictions, as blockchain technology enables global participation.

Lastly, since in real-world asset tokenisation, the underlying asset (a ship in this case) exists 'off-chain,' synchronization with the 'on-chain' system of record can be complicated. Regulatory complexities, specifically with ships that operate in international waters and are governed by multiple jurisdictions, where a vessel may fly the flag of one country, be owned or mortgaged and then chartered by companies in other states, insured in some other country, managed elsewhere, and operated by a multinational crew are also significant considerations for operationalizing the smart contract. Shipping revenues are subject to volatility depending upon freight rates, fuel costs, and global trade dynamics, impacting predictable returns on investments. Market awareness of tokenisation remains limited. The legal status and enforceability of smart contracts further raise important concerns regarding consumer protection.

Regulatory Framework. The regulatory environment for asset tokenisation remains nascent, which is why it has yet to achieve scalability among market participants despite its theoretical benefits. A clear legal status is essential to build trust and enable mass adoption. Unlike traditional banks that follow standardized frameworks such as the Basel guidelines issued by the Bank for International Settlements (BIS), along with regional and national financial regulations, tokenisation continues to lack a global regulatory consensus. However, various jurisdictions have developed rules to provide legal standing for tokenisation in their respective regions, as mentioned in Figure 8.[45] The details of these regulations are presented in Appendix C.

Figure 8: Regulatory Developments by Different Jurisdictions



Source: Authors' Compilation.

CASESTUDY – Tokenisation of FUJI LNG Carrier[46]

Tokenisation in the maritime sector is gaining traction, with pilots being run through proof-of-concept or sandboxes for tokenizing of vessels. One such experiment was conducted by EVIDENT in collaboration with GreenSeas for the tokenisation of FUJI LNG Carrier managed by TMS Cardiff Gas.

> GreenSeas, an early-stage venture supported by shipping magnate George Economou, emerged as a pioneer in democratizing investments in the maritime industry, specifically in individual cargo ocean-going vessels. Traditionally, this sector was only accessible to highly capitalized groups. Through a partnership with EVIDENT, GreenSeas has broken new ground by tokenizing the LNG carrier, FUJI LNG, thus opening the investment door to a wider audience via smaller ticket purchases. This groundbreaking initiative covered the full spectrum of private placement, including structuring, issuance, tokenisation, listing, primary placement, and secondary market trading, marking a significant advancement in maritime asset investment.
>
> Source: https://www.evident.capital/whitepapers/fuji-lng-carrier-case-study

In brief, the FUJI LNG Carrier is a vessel designed for transporting LNG worldwide and generates a robust income stream from long-term charters. The implementation took place in phases:

a. *Establishing the SPV*. Creating a Special Purpose Vehicle to hold the asset.
b. *Structuring the Investment.* Defining rights and obligations for token holders.
c. *Issuance of Tokens*. Representing fractional ownership in the asset.
d. *Listing.* Offering tokens on the EVIDENT platform for primary subscription.
e. *Trading.* Facilitating peer-to-peer transactions on the secondary market.

f. *Exit.* Successfully winding down the structures and returning liquidity to investors through asset sale.

In their report,[47] it was stated that "This case study underscores the role of GreenSeas and EVIDENT in introducing blockchain technology to maritime investment, opening the industry to broader participation, and setting a new standard for asset tokenisation. The initiative proved successful, with investors exiting at a 26 per cent return on investment." (Details of the Project are in Appendix D).

Fintech platforms are actively exploring asset tokenisation in the shipping industry by introducing marine tokens. Two such blockchain platforms are Shipfinex,[48] which offers Marine Asset Tokens (MATs), and Oceanis,[49] which provides advanced and AI-empowered tools in the ship financing space. Hence, there is already some early traction in the introduction of this novel concept of ship financing which could be role modeled as an Indian specific fintech product for the shipping industry.

Real-World Asset Tokenisation in India

India recognizes tokens under the Virtual Digital Asset (VDAs) definition, as stated in Chapter 1, Section 2 (111) of the Income Tax Act, 2025.[50] It has also been classified as a capital asset of an assessee under the "property" domain, and income generated from its transfer is taxable at 30 per cent without any deduction in respect of expenditure and set-off of losses.

The IT Department of the Telangana Government has published a 'Technical Note on Asset Tokenisation' which explains how tokenisation works, how it can transform the dynamic fintech environment in India, and the adaptability of the technology by any company or startup that wants to pursue the path of tokenisation.[51]

The Reserve Bank of India (RBI) has recently launched a retail sandbox for its CBDC paving way for fintech firms to develop innovative solutions for this pilot.[52] This initiative will facilitate smooth implementation of tokenisation.

India, through its innovative financial center at GIFT City, regulated under the IFSCA, has announced several initiatives for RWA tokenisation:-

a. A real estate development firm, Collated Ventures,[53] has launched a blockchain fintech platform, Terazo, to tokenize assets on

the Polygon blockchain. Collated is partnering with Indian construction firm Savvy Group,[54] aiming to raise US$ 7 million for a building within the GIFT City Special Economic Zone (SEZ). The tokenisation platform operates within the GIFT City sandbox, and investments are structured through the GIFT City Category III Alternative Investment Fund (AIF). However, the investment is not entirely open to retail investors; eligibility is restricted to an approved list of investee countries, with a minimum net worth requirement of US$ 150,000.[55]

b. In February 2024, the IFSCA granted Limited Use Authorization to Hyderabad-based fintech firm Realdom India Pvt. Ltd.[56] Company will offer real estate asset tokenisation through its platform, Pinvest Exchange.[57]

c. In 2025, IFSCA rolled out a Consultation Paper, 'Regulatory Approach Towards Tokenisation of Real-World Assets,' to recommend measures for the development of a digital asset ecosystem in GIFT IFSC.[58]

These initiative and policy interventions have set the stage for adopting fractional ownership of ships through tokenisation of vessels in India.

Therefore, India is well on course to introduce tokenisation to finance real world assets. Further the Government of India has recently granted infrastructure status to 'large ships' and included them in the harmonized master list of infrastructure sub-sectors under the 'transport and logistics' category. Commercial ships having ≥ 10,000 GT registered and owned in India and vessels with 1,500 GT built, owned, and registered in India will be accorded the 'large ships' status. This strengthens the case for the tokenisation of vessels in India, as infrastructure status incentivizes low-cost financing with relaxed taxation for shipping companies.[59]

Recommendation

Given the complexity of the issues involved, it is recommended that the Government of India set up an Expert Committee/Task Force to facilitate, supervise and regulate ship tokenisation in the country. A proposed composition, terms of reference and deliverables are placed at Appendix E.

Conclusion

India's maritime capability has grown rapidly in port infrastructure, ship management, and seafaring excellence. Yet, the next phase of growth — in ship ownership, financing, and registry innovation — demands a bold, forward-looking approach. Globally, countries are reimagining how ships and other high-value assets can be financed and traded through secure digital frameworks.

Tokenisation is revolutionizing maritime investment by transforming traditionally illiquid and capital-intensive assets — such as cargo ships, ports, and carbon credits — into accessible, tradable digital tokens. This innovation is unlocking new capital sources for fleet expansion, enhancing infrastructure development, and driving sustainability efforts through tokenized investments. As adoption accelerates, maritime tokenisation is poised to reshape the future of global shipping, democratizing access to one of the world's most essential industries while fostering financial innovation and environmental responsibility.

India can pursue tokenisation to finance and create a shipbuilding and ship owning ecosystem in the country towards enhancing the registered tonnage under the India-flag and achieve the target of becoming top 5-ranked countries in registered tonnage as outlined in the MAK47. Various facilitative frameworks already exist such as infrastructure status to 'large ships,' an ambitious ship building plan, introduction of Central Bank Digital Currency, and the recognition of virtual assets in the Income Tax Act (2025)[60] amongst others.

Such initiatives align perfectly with the Maritime India Vision 2030, the Amrit Kaal 2047 agenda, and the Digital India mission, reflecting the nation's commitment to technological and financial leadership. This presents a unique opportunity for India to extend that initiative to maritime assets — ships, fleets, and shipbuilding projects — positioning itself as a global leader in maritime digital finance.

The convergence of shipping, finance, and digital governance opens a new horizon for India's maritime economy. By enabling tokenisation of real-world maritime assets, India can:-

a. Unlock global investor participation in Indian tonnage;
b. Facilitate faster, lower-cost capital access for shipowners and shipbuilders;
c. Integrate India's ship registry and finance systems through secure digital ledgers;
d. Attract international shipowners to register and finance vessels under Indian jurisdiction.

The eco-system exists for India to assume stewardship of this fintech instrument which can not only stimulate investments in the Indian Fleet but also be the tested conduit for other economies to leverage the same fintech platform for their shipping finance requirements. Therefore, there is a potential prospect of crowd sourcing finance from domestic and international investors – initially through institutions and HNIs and later through retail investors from a global resource base – after due diligence of established KYC/AML procedures.

However, the issues being complex and technical in nature it is highly recommended that an Expert Group or a Task Force be Constituted by the Ministry of Ports, Shipping and Waterways to prepare robust guidelines for fractional ownership of ships through block chain driven, AI enabled, smart contracting ensuring trustworthy and transparent transactions using digital ledgers to make India a leading player in new reforming and transforming the global financing ecosystem of ships.

Appendix A

Requirement Analysis: Financing Shipbuilding

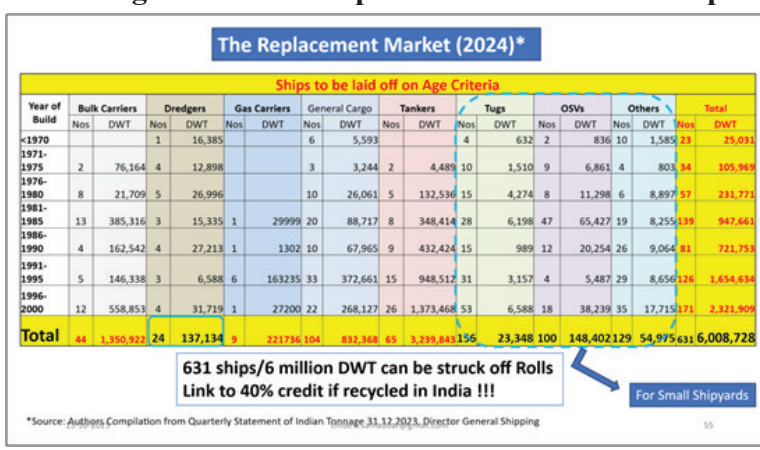
A detailed investigation of the Indian shipbuilding requirements to align with the objectives of Maritime India Vision 2030(MIV30) and the Maritime Amrit Kaal Vision 2047(MAKV47) was carried out at the Research and Information Systems for Developing Economies, New Delhi. The study matched the projected cargo requirements – for both coastal and EXIM cargo – with the tonnage (DWT) required to ship the same. Further, cognizance was also taken of the emerging technologies and the global trends in ship building to identify the various types of ships – Bulkers, Boxships, Tankers, Gas carriers etc. – together with the national ship building capacity to determine a high level understanding of the characteristics of the future Indian Fleet.

The analysis is placed in the succeeding paragraphs and discussed as various elements of the shipbuilding strategy across a 4 tier build plan as follows:

#1 Target the Replacement Market

As per a study 631 ships with a DWT exceeding 6 million DWT are more than 25 years old which are ripe for replacement as per existing policy of the DG Shipping[61] as depicted in the Figure A1 below.

Figure A1: The Replacement Market for Ships



Year of Build	Bulk Carriers		Dredgers		Gas Carriers		General Cargo		Tankers		Tugs		OSVs		Others		Total	
	Nos	DWT	Nos	DWT	Nos	DWT	Nos	DWT	Nos	DWT	Nos	DWT	Nos	DWT	Nos	DWT	Nos	DWT
<1970			1	16,385			6	5,593			4	632	2	836	10	1,585	23	25,031
1971-1975	2	76,164	4	12,898			3	3,244	2	4,489	10	1,510	9	6,861	4	803	34	105,969
1976-1980	8	21,709	5	26,996			10	26,061	5	132,536	15	4,274	8	11,298	6	8,897	57	231,771
1981-1985	13	385,316	3	15,335	1	29999	20	88,717	8	348,414	28	6,198	47	65,427	19	8,255	139	947,661
1986-1990	4	162,542	4	27,213	1	1302	10	67,965	9	432,424	15	989	12	20,254	26	9,064	81	721,753
1991-1995	5	146,338	3	6,588	6	163235	33	372,661	15	948,512	31	3,157	4	5,487	29	8,656	126	1,654,634
1996-2000	12	558,853	4	31,719	1	27200	22	268,127	26	1,373,468	53	6,588	18	38,239	35	17,715	171	2,321,909
Total	44	1,350,922	24	137,134	9	221736	104	832,368	65	3,239,843	156	23,348	100	148,402	129	54,975	631	6,008,728

***Source*:** Authors' Compilation.

The summary of the minimum investment requirement of INR 48,000 crore is shown in Table A1.[62]

Table A1: The Replacement Opportunity

Vessel Type	Number of Vessels Required	DWT
Bulk Carrier	44	1,350,922
Dredgers	24	137,134
Gas Carriers	9	221,736
General Carriers	104	832,368
Tankers	65	3,239,843
Tugs	156	23,348
OSVs	100	148,402
Others	129	54,975
Total	631	6,008,728

Source: Author retrieved the data from Indian Shipping Statistics, 2024

#2 Invest in the Coastal Fleet

As per the projections in the MIV2030 for shipping of various commodities by coastal shipping, the requirement analysis is depicted in the Table A2.

Table A2: Requirement Analysis for Coastal Cargo Carriers by 2035 (MIV 2030 Projections)

Product	Projected Cargo (MMT)	Ship Size (DWT) Tons	Indicative NT (Tons)	No of Voyages /month	Ships Required (Nos)	Unit Cost INR (Crs)	Total Cost INR (Crs)
Bulk/Break Bulk			0.6				
Coal (Ex 1.1.7)	100	100000	60000	2	69	480	33333
Iron Ore (Ex 1.2.1)	105	100000	60000	2	44	480	21000
Steel (Ex 1.30)	14	8000	4800	3	49	20	972

Continued...

Cement (Para 1.2.1.5)	13	8000	4800	3	45	20	903
Fertilisers (ADB report)	6	8000	4800	3	21	20	417
Total Bulk Carriers					228		56625
Containerised (TEU)	Projected Cargo	Ship Size TEU	Indicative NT (Tons)	No of Voyages /month	Ships Required (Nos)	Unit Cost (2022)	Total Cost INR (Crs)
Cotton (MMT)	15	1700		3	10	220	2247
Ceramics (MMT)							
Food Grains (MMT)							
Cars (nos)	200000	1000		4	33	112	3733
Other goods (MMT)	10	1700		3	7	220	1498
Total Container Carriers					50		7478
POL (Ex1.1.0) (MMT)	100	50000	30000	3	56	360	20000
Total Product Tankers					56		20000
Total Outlay					334		84103

Source: Authors' Calculation.

#3 Expand the EXIM Fleet

India is dependent on foreign-flagged ships which threaten its strategic autonomy in terms of energy and critical minerals security and therefore, VLCCs and VLGCs need to be acquired to ensure long-term cost efficiency, fleet autonomy, and strategic control over vital energy logistics. Presently 95 per cent of Indian merchandise goods aggregating about 1,055 MMT are carried on foreign hulls resulting in an annual outgo of US$75billion towards freight charges. Key deficiencies exist in crude and product tankers, Gas and Chemical carriers, bulk carriers, and box ships. Also, the MAKV47 projects that the total merchandise cargo will

grow from 1,290 MMTPA (2019) to 5,468 MMTPA by 2047 including a growth in containerized cargo from about 13 MTEU (2024) to 2,895 MTEU in the same period.[63] As a back of the envelope calculation, transportation of about 5,000 MMTPA merchandise would need 2,894 Suezmax bulk carriers averaging 2 international voyages a month requiring an investment between of INR 13 – 16 lakh crore (2025 prices).

As an example, the potential for shipping 'Made in India' automobiles to global markets presently carried on foreign Ro-Ro ships to containerized cargo is also significant. As of 2024 automobile export data[64] this would require 21 box ships of 3,700 TEU capacity (to meet the feeder segment alone) worth about INR 90,000 crore This unit cost of acquisition has been arrived at around US$ 14,000 per TEU, which is a growing market and hence as the automobile exports grow more container ships would be required - as a thumb rule for every increase of exports of 80,000 automobiles one 3,700 TEU ship would be additionally required. Table A3 refers.

Table A3: Requirement Analysis: Container Carriers for India's Automobile EXIM Cargo (2024)

Type of Vehicle	Exports (Nos)	Units/ 40 ft Container	(TEU) equiv	Cap/ Voyage (TEU)	Total Voyages	No of Ships @ 10 Voyages/ Yr	Unit Ship Acquisition Cost INR Crs	Total Cost in INR Crs
Passenger Vehicles	770364	4	385182	3700	104	10.4	4144	43140
Commercial Vehicles	80986	1	161972	3700	44	4.4	4144	18141
Three Wheelers	306914	18	34102	3700	9	0.9	4144	3819
Two Wheelers	4198403	40	209920	3700	57	5.7	4144	23511
Total						21		88612
Note1: 3700 TEU container ship specifications: L~ 200m; B~35m: Draught~11 m: DWT~32000T								

Source: Authors' Calculation.

#4 Imbibe High Technology SMART ship building.

This includes adoption of lighter, stronger materials like aluminum alloys and composites, Computer-aided design (CAD) Digital Twins and AI to optimize design and processes and improve hull shapes to reduce drag and increase stability, standardization through demand aggregation, robotic and additive manufacturing etc. leading to substantial modernization of the shipbuilding ecosystem. This is illustrated in Figure A2 below.

Figure A2: SMART Shipbuilding

SMART (Systems, Materials, Automation, Robotics, Technologies) Shipbuilding

Materials: Adopt *lighter, stronger materials* like aluminum alloys and composites for strength, lesser weight & longer life.

Design:

- Computer-aided design (CAD) and simulation technologies to *improve hull shapes to reduce drag* and increase stability.
- Artificial intelligence: AI is being used to *optimise design and processes.*

Supply Chain

- Achieve *Size and scale for sustainable supply chains.*
  - Demand Aggregation
  - Standardization

Construction:

- Robotics are being used to *automate tasks* like welding, cutting, and painting.
- *Digital Twins*: Virtual and augmented reality for part positioning and integration.
- *Additive manufacturing*: This technology is being used to produce medium to large-sized components.
- *Data analytics*: Companies are using data analytics to optimize production schedules, reduce waste, and improve efficiency.
- *Modular Construction*. Build Blocks anywhere and Integrate.

Cybersecurity: IT systems and devices on ships are being protected.

Source: Authors' Calculation.

Summary

As can be seen from the foregoing analysis the cumulative requirement to meet the cargo projections and the associated ship building effort a total investment of about INR 16-17 lakh crore (2025 prices) would be required.

Appendix B

ERC3643[65] - A Primer

ERC3643 protocol is an open-source suite of smart contracts that enables the issuance, management, and transfer of permissioned tokens. Its built-in decentralized identity framework, ONCHAINID, ensures only users meeting pre-defined conditions can become token holders, even on permissionless blockchains. It enables tracking of legal ownership, and thus safeguarding token holders. The compliance is built in its design, verifying the identity and eligibility of participants so that all transactions adhere to KYC/AML regulations and other predefined rules. Its Code name is T-REX Protocol. Its key features include:

a. *Identity Management*. Linked to on-chain identities via ONCHAINID, with verification by authorized parties and secure storage on blockchain;

b. *Permissioned Transfers*. Transactions, governed by compliance rules, are executed only if they meet the criteria;

c. *Compliance by Design.* Regulatory checks, including verification of identity and necessary credentials, are performed before completing transactions, compliance modules, and AssetID enrichment can also be added;

d. *Interoperability.* Fully compatible with existing ERC-20 platforms and tools,[66] enabling seamless integration into current blockchain ecosystems.

Figure B1 explains the mechanism of ERC3643 tokens on both the primary (issuance) and secondary market (trading).

Figure B1: Working Mechanism of ERC3643

***Source*:** ERC3643

Appendix C

Extract of Regulatory Regimes Across Jurisdictions

Several countries have established regulatory frameworks for tokenisation, the details of which are provided in Table C1. Dubai regulates Asset Tokenisation through the Virtual Assets Regulatory Authority.[67] Liechtenstein introduced the Physical Validator[68] as a third-party intermediary and sets the legal framework for services on Trusted Technology (TT) systems.[69] India recognizes the Virtual Digital Asset in the Income Tax Act, 2025.[70]

Table C1: Region-wise Features of Laws Related to Tokenisation

Country/State	Legislation	Details
Dubai	Virtual Assets Regulatory Authority (VARA)	Sector-specific rulebooks - Issuance, Market Conduct, Custody, Exchange, and for asset-referenced tokens Issuers must file a whitepaper with detailed disclosures Only licensed entities can issue, list, or custody tokens Describes rules for Asset-Referenced Virtual Asset (ARVA) Defines any 'Virtual Asset that represents, direct or indirect, current, future or contingent ownership of any Real-World Asset, entitlement to receive or share any income, purports to maintain a stable value or reference to any type or combination of RWA(s) or Income, represents, or purports to represent, entitlement to receive or share any value that is, or purports to be, or in any manner originate from, derived from or backed by (including but not limited to under any securitization, collateralization, or guarantee arrangement) any type or combination of RWA or Income or, is a directly or indirectly wrapped, duplicated, fractionalized, securitized or derivative version of any other ARVA.'
Singapore	Regulation through the Monetary Authority of Singapore (MAS)	Treats digital-asset activity through the lens of securities/ market services and payments/AML Uses sandboxes for innovation and enforces strong KYC/ AML, Travel-Rule, market-abuse safeguards, while letting regulated pilots de-risk new models.

Continued...

Continued...

Liechtenstein	Token and Trusted Technology Service Provider Act (TVTG)	Creates a legal "container" concept—linking a token to the real-world asset and the rights it confers. The Act introduced trusted third party intermediary called Physical Validator to bridge the gap between offline and online world, assuring underlying asset representing token truly exists, ensuring enforcement of rights, and allowing for valid transfer. The Act also sets the legal framework for services on Trusted Technology (TT) systems that are transaction systems providing trustworthy technologies and enable diverse economic transactions.
European Union	Markets in Crypto-Assets	Creates pan-EU rules for crypto-assets, including asset-referenced tokens (arts), with issuer obligations, whitepapers, and reserve/claims frameworks.
Switzerland	Existing Laws amended to accommodate DLT	Recognized DLT-based securities and enabled DLT trading facilities under financial-market law.
United Kingdom	Financial Services and Market Act 2023	Relies on regulatory perimeters, sandboxes, and strong consumer protection with clear risk disclosures.
Japan	Regulation through the Financial Services Agency	Tight custody, hot/cold wallet segregation, and governance controls; bank-grade standards.
India	Chapter 1, Section 2 (111), Income Tax Act, 2025	"any information or code or number or token (not being Indian currency or foreign currency), generated through cryptographic means or otherwise, called by any name, providing a digital representation of value exchanged with or without consideration, with the promise or representation of having inherent value, or functions as a store of value or a unit of account including its use in any financial transaction or investment, but not limited to investment scheme; and can be transferred, stored or traded electronically; a non-fungible token or any other token of a similar nature, by whatever name called; any other digital asset, as the Central Government may, by notification, specify, any crypto-asset being a digital representation of value that relies on a cryptographically secured distributed ledger or a similar technology to validate and secure transactions, whether or not such asset is included in sub-clause (a) or (b) or (c), where,— (i) "non-fungible token" means such digital asset as the Central Government may, by notification, specify; (ii) the Central Government may, by notification, exclude any digital asset from this definition, subject to such conditions as specified therein."

Source: Author's Compilation.

Appendix D

Case Study: The Fuji LNG Carrier[71]

Background

FUJI LNG Carrier is a vessel designed for transporting LNG worldwide and generates a robust income stream from long-term charters. EVIDENT (first fully-integrated Securities and Finance Commission (SFC) licensed investment platform for alternative assets in Hong Kong), in collaboration with GreenSeas (a company managed by TMS Cardiff) facilitated the tokenisation of the Fuji LNG Carrier Gas using EVIDENT's platform through an SPV.

Tokenisation of Fuji LNG Carrier

The EVIDENT's secondary market operated on an OTC platform and transactions were settled on the Algorand Blockchain,[72] ensuring immediate redemption and secured between self-custody-based wallets. To ensure compliance, EVIDENT implemented a robust legal and regulatory framework, classifying tokenized assets as digital securities. This involved creating a legal structure through a Limited Partnership Fund (LPF) and SPV, defining rights and obligations, and carrying out comprehensive KYC and AML checks of investors. Smart contracts governed the asset, while critical documents were immutably stored on the InterPlanetary File System (IPFS).Security features such as 'freeze'[73] and 'clawback mechanisms'[74] safeguarded against hacking and fraud. The key aspects are briefly described below.

a. Asset Profiling:

i. Physical Asset. Fuji LNG Carrier

ii. Investment Period. May 2022 to March 2023

iii. Asset Valuation. Derived through the inherent value of the carrier adjusted for depreciation (valuation of these ships can increase, as they are frequently traded in the secondary market) and a resilient income stream through leasing via long-term charters to clients (lease rate calculated through supply and demand dynamics).

According to the Institute for Energy Economics and Financial Analysis, LNG supply capacity is expected to rise to 666.5 MTPA by 2028, exceeding projections by the International Energy Agency. This projection further strengthens the income-generating capacity of the LNG carrier.[75]

iv. Due Diligence and Compliance. EVIDENT collaborated with all stakeholders to develop the legal framework, including their rights and obligations. The project was designed as a private placement conducted outside of Hong Kong (where EVIDENT is based). The assets were initially classified as securities, and through the tokenisation process, they were transformed into digital securities, subject to the same regulations as traditional securities.

b. Securitization:

v. Establishing the SPV. EVIDENT collaborated with GreenSeas (a platform for investing in cargo vessels) to establish a SPV to tokenize the Fuji LNG carrier, serving as the legal entity for the tokenisation process. The SPV functioned as an independent entity that owned the asset, offering a transparent and straightforward structure for investors.

c. Tokenisation Structuring:

vi. Structuring Investment. EVIDENT used blockchain technology to create smart contracts to automate the handling of tokens and structured the investment through SPV by clarifying the legal framework and ensuring compliance with the established legal framework.

vii. Issuance of Tokens. The SPV issued tokens that digitally represented the asset's value, distributed through primary placement, and gave legal rights in the asset to the investor in proportion to their investment.

viii. Listing and Trading. The tokens were listed on the EVIDENT platform for primary trading and investors could subscribe to the tokens through the Commitment Campaign function.

ix. Trading. To provide liquidity to token holders, tokens could be bought or sold on EVIDENT peer-to-peer OTC secondary market after listing.

d. Investors:

x. The project only included institutional and accredited professional investors. Due diligence through KYC and AML was performed.

xi. Coupled with its inherent asset value, it represents an attractive investment opportunity, particularly in the evolving global energy transportation sector.

e. Investment Returns and Exit:

xii. Due to favorable market conditions, the owner of the LNG Carrier chose to sell the asset before its lifecycle concluded, allowing investors to receive their portion of the sale proceeds.

xiii. The Fuji LNG Carrier generated US$ 10.23 million in free cash flow, with an IRR of 15per cent and a RoI of 26 per cent (initial token price US$ 1.00 and exit token price US$ 1.26).[76]

This case study underscores the role of GreenSeas and EVIDENT in introducing blockchain technology to maritime investment, opening the industry to broader participation, and setting a new standard for asset tokenisation.

Appendix E

Proposal for Formation of A Task Force on Maritime Asset Tokenisation and Digital Ship Finance

1. India's Maritime Future in the Digital Era

India's maritime capability has grown rapidly in port infrastructure, ship management, and seafaring excellence. Yet, the next phase of growth — in ship ownership, financing, and registry innovation — demands a bold, forward-looking approach. Globally, countries are reimagining how ships and other high-value assets can be financed, owned and traded through secure digital frameworks. India has already demonstrated global leadership in digital public infrastructure, financial innovation, and maritime development. This situation presents a unique opportunity for India to extend that initiative to finance maritime assets — ships, fleets, and shipbuilding projects — positioning itself as a global leader in maritime digital finance.

2. Strategic Rationale

This initiative reflects India's strategic commitment to technological and financial leadership in the maritime sector. By enabling tokenisation of real-world maritime assets, India can:

a. Unlock global investor participation in Indian tonnage;

b. Facilitate faster, lower-cost capital access for shipowners and shipbuilders;

c. Integrate India's ship registry and finance systems through secure digital ledgers;

d. Attract international shipowners to register and finance vessels under Indian jurisdiction.

3. The Opportunity

The IFSCA framework for RWA Tokenisation (RWAT) provides a ready and robust regulatory foundation for digital assets backed by real-world value. Leveraging this framework for maritime applications can:

a. Create new financing channels for ships, offshore assets, and shipyards;

b. Build digital transparency in asset ownership and finance;

c. Enable India to become a hub for maritime asset issuance, trading, and management under its own laws.

This is an opportunity that needs to leverage India's institutional ecosystem. However, there are complex issues involved which may require deeper expertise and multi-disciplinary consultations to operationalize it for the maritime domain.

4. Proposal

It is proposed to constitute a Task Force/Expert Committee on Maritime Asset Tokenisation and Digital Ship Finance to examine how India's existing RWAT framework can be extended to the maritime sector, ensuring secure, transparent, and compliant digital representation of ships and ship-related assets.

5. Suggested Terms of Reference for the proposed Task Force

The Task Force/Expert Committee may examine the following issues:

a. Framework Adaptation:

   Examine the IFSCA RWAT framework and develop maritime-specific adaptations for ships, fleets, and shipbuilding projects.

b. Regulatory Coordination:

   Recommend mechanisms for seamless coordination among MoPSW, IFSCA, DG Shipping, RBI, SEBI, and CBDT.

c. Digital Integration:

Explore integration of India's ship registry with digital ledger systems for transparent ownership and mortgage traceability.

d. Fiscal Incentives:

Evaluate fiscal and tax measures under GIFT City and IFSCA to attract global investors and shipowners to register and finance vessels in India.

e. Technology Standards:

Recommend standards for blockchain use, cyber security, and digital record verification to ensure safety and interoperability.

f. Pilot Implementation:

Identify and design a 12-month pilot project for maritime tokenisation within the IFSCA regulatory sandbox, in collaboration with DG Shipping.

6. Composition of the Task Force (Indicative)

The composition of the Committee could be as follows:-

a. Chairperson. Nominated by Ministry of Ports, Shipping and Waterways (MoPSW)

b. Co-Chairperson. Nominated by Ministry of Finance (MoF)

c. Members:

i. Director General Maritime Administration

ii. IFSCA (Member Secretary)

iii. Nominee of RBI (IFSC Division)

iv. Nominee of Financial Intelligence Unit – India (FIU-IND)

v. Nominee of SEBI

vi. Nominee of CBDT

vii. Nominee of RIS/CMEC, New Delhi

viii. Nominee of Ministry of Electronics and Information Technology (MeitY)/NIC

d. Special Invitees. Industry Experts drawn from the community of :

i. Shipowners, Financiers, Insurers and Ship Charters

ii. Blockchain Firms and Forums

iii. International Maritime Law Experts

iv. Shipyards

v. Nominee of IIM, Mumbai (Financial Management)

7. Expected Outcomes

a. Draft guidelines for establishing a regulatory framework for maritime applications through a designated regulated authority.

b. Compliance requirements mapping with existing laws, for KYC, PMLA, AML, FEMA, and any other relevant legislation

c. Identification of additional infrastructure and resources required, like integration of traditional and tokenized models, including e-CBDC.

d. Framework for investor protection.

e. Blueprint for a digital ship registry and finance ecosystem, leveraging IFSCA's infrastructure.

f. Regulatory and operational roadmap for pilot projects in GIFT City.

g. Strengthening of India's shipbuilding, ship-owning, and maritime finance capabilities.

h. Establishment of India as a global reference point for maritime digital finance and asset management.

8. Implementation Timeline

Phase	Duration	Outcome
Phase I	0–3 months	Task Force formation, stakeholder consultation
Phase II	3–4 months	Draft recommendations on framework adaptation
Phase III	4–10 months	Pilot project under IFSCA sandbox
Phase IV	10–12 months	Final recommendations and implementation roadmap

9. Conclusion

India can now redefine its maritime identity — from a seafaring nation to a digital maritime finance leader. The formation of this Task Force will mark the beginning of a new era — where ships, capital, and technology converge under an Indian-regulated, globally recognized, and digitally empowered framework.

Through vision and coordination, India can lead the world in real-world maritime tokenisation — setting global benchmarks in innovation, transparency, and governance.

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