

Developing Green Defence Financing for Indo-Pacific Maritime Security Resilience

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Abstract

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Purpose: To conceptualise a sustainable defence financing model by embedding green finance principles into maritime security frameworks in the Indo-Pacific, where ecological vulnerability and geopolitical pressures are intensifying.

Study Design/Methodology/Approach: A descriptive, qualitative approach is adopted to explore secondary sources, including policy documents, multilateral reports, and scholarly literature. Institutional Theory and Resource-Based Theory guide the analytical lens to examine how legitimacy, regulatory adaptation, and internal capacities shape green-oriented defence mechanisms.

Findings: Defence financing strategies that align with ESG principles offer a pragmatic response to regional instability and environmental threats. Key mechanisms identified include the issuance of green bonds, the development of low-emission technologies, ESG-based procurement criteria, and collaborative financing through regional platforms. Successful integration depends on institutional coherence and innovation capacity across the defence and financial sectors.

Originality/Value: Introduces a novel intersection between green finance and defence strategy within Indo-Pacific policy discourse. Provides an interdisciplinary model that reframes defence financing as both a geopolitical instrument and a sustainability lever, offering actionable insights for national governments, financial institutions, and multilateral bodies.

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INTRODUCTION

The Indo-Pacific region has increasingly gained prominence as a strategic centre within the evolving global geopolitical and economic landscape. Its significance in international trade, maritime connectivity, and regional cooperation is accompanied by escalating security tensions and growing environmental vulnerabilities (Darwis, 2020; Scott, 2013). The convergence of security pressures and ecological challenges underscores the growing need to integrate defense and environmental considerations within national and regional strategies. As a result, sustainable defence financing has emerged as an essential mechanism to align security imperatives with environmental, social, and governance (ESG) principles (Badawi & Nugroho, 2022; Li et al., 2023).

The escalation of geopolitical competition, particularly between the United States and China, has triggered an increased deployment of military and naval assets across strategic maritime zones, including the South China Sea and the Indian Ocean (Sholihah & Nugroho, 2025; Sukmawijaya et al., 2022). Concurrently, island and coastal states in the region face significant climate-related risks, including rising sea levels, coastal erosion, and the intensification of natural disasters (Fitton et al., 2018; Setyadi et al., 2025; Singh et al., 2021). These environmental pressures threaten not only marine ecosystems but also the long-term sustainability of trade, logistics, and food security. Accordingly, maritime resilience must be understood as inseparable from environmental governance, requiring the defence sector to adopt more sustainable and inclusive financing approaches.

Globally, there is increasing recognition of the environmental consequences of defence operations (Belcher et al., 2019; Zandi et al., 2019). Several countries have begun introducing energy-efficient technologies, renewable energy sources, and digital innovations in their military infrastructure to improve naval operational performance. However, the adoption of these practices remains uneven in the Indo-Pacific. Although collaborative efforts are emerging, including green port infrastructure and the digitalization of maritime logistics (Bryson et al., 2006; Wadjdi et al., 2023), the defense sector remains excluded mainly from mainstream green finance (Nugroho et al., 2019; Nuraeni et al., 2024). This exclusion stems from prevailing assumptions that defence is incompatible with sustainability objectives and from the lack of standardised tools to assess its environmental impact (Nugroho et al., 2020).

This disconnect between conventional defence financing, which remains focused on military hardware, and ESG-driven financial mechanisms poses a critical challenge. Defence expenditures that neglect environmental considerations risk contributing to marine pollution, inefficient energy use, and damage to coastal ecosystems. In contrast, integrating ESG principles into defence funding offers significant potential to enhance national resilience by supporting energy-efficient systems, strengthening climate adaptation capabilities, and protecting ecologically sensitive maritime zones (Fantony et al., 2023; Ramadhani & Nugroho, 2024; Weber et al., 2021). In a broader regional context, this approach may also contribute to a more cooperative and constructive form of defence diplomacy.

Despite these possibilities, the Indo-Pacific faces institutional and structural constraints. These include the absence of regulatory frameworks to govern sustainable defence finance, limited involvement from financial actors, and a lack of incentives to support green innovation within defence institutions (Tsendeliani et al., 2023).

Fragmented coordination among government bodies responsible for defence, finance, and environmental protection further undermines progress.

This study addresses these gaps by proposing a conceptual framework for sustainable defense financing that integrates ESG principles into maritime security strategies in the Indo-Pacific. Drawing on Institutional Theory and the Resource-Based View, the article contributes to the interdisciplinary literature on security and sustainability. It also provides practical guidance for financial institutions, defence actors, and maritime stakeholders to support green innovation through investment in low-emission military technologies, renewable energy systems, and digital operational infrastructure. The research further highlights the need for regulatory instruments and fiscal policies that enable collaborative financing mechanisms to advance ecological and geopolitical resilience. To frame this inquiry, the article is guided by three research questions. It examines how a defence financing strategy incorporating green finance principles can be implemented in the Indo-Pacific region. Furthermore, it investigates the challenges and opportunities that shape the integration of sustainable finance policy with maritime defence requirements. Finally, it explores the roles of financial institutions, national governments, and regional cooperation in advancing a feasible and actionable model of sustainable defence financing.

This article aims to develop an integrated framework that links ESG-based green finance with sustainable maritime defence strategies in the Indo-Pacific. Drawing upon Institutional Theory and the Resource-Based View, the study offers both theoretical insight and practical relevance. It contributes to the limited scholarship that connects environmental finance with defence innovation and provides policy guidance to promote cross-sectoral collaboration, institutional reform, and regional resilience.

LITERATURE REVIEW

Theoretical Studies

Sustainable defence financing in the Indo-Pacific is conceptually supported by Institutional Theory and the Resource-Based View (RBV). Institutional Theory explains how defence institutions respond to normative, regulatory, and cognitive pressures arising from international norms on environmental sustainability and ESG standards (Alunaza & Sherin, 2022; Crank, 2003; Istianah & Nugroho, 2024; Lawrence, 1999). Institutional legitimacy is crucial as governments adopt green finance frameworks to meet global expectations and enhance their international credibility (Pasupuleti & Rao, 2023; Talha, 2023). In parallel, the Resource-Based View provides an internal perspective by emphasizing the importance of developing and mobilizing strategic resources within defense institutions. These resources include environmentally sound maritime technology, sustainable infrastructure, and collaborative networks with financial institutions (Fahy, 2000; Hitt et al., 2015; Nugroho et al., 2024; Sher & Nawaz, 2021). The combination of both theories enables a comprehensive understanding of how external institutional demands and internal organisational capacities interact to support the development of credible, strategic, and adaptive models for sustainable defence financing in the Indo-Pacific region.

Empirical Research

Empirical studies on sustainable defence financing demonstrate a growing integration of environmental principles into military operations. The United States military, for instance, has implemented solar panels, biofuels, electric vehicles, and other energy-efficient technologies to improve operational performance while reducing its environmental impact (Hu et al., 2023; Svoboda, 2023). These practices reflect the broader objectives of Sustainable Defence Financing, which prioritise ecological accountability, resource optimisation, and resilience to climate risks. Field-level applications include improved energy management at military bases, the development of green procurement mechanisms, and funding allocations for climate adaptation infrastructure in defence sectors.

In the domain of green finance, empirical evidence highlights the critical role of financial institutions in shaping corporate sustainability behaviour. Banks with robust ESG profiles tend to offer more favourable lending conditions to borrowers with firm ESG commitments, thereby improving borrower performance while reducing the cost of capital (Buallay, 2019; Houston & Shan, 2021). Empirical research also confirms that regulators are increasingly embedding ESG factors into financial governance to promote long-term stability and sustainability in the financial system (Aldowaisi et al., 2022; Chen et al., 2024). Instruments such as green bonds, sustainability-linked loans, and other climate finance tools have become essential for mobilizing resources toward renewable energy, energy efficiency, and low-carbon infrastructure (Auzepy et al., 2023; Lyu et al., 2023; Nur Aini et al., 2023). These instruments have also expanded access to capital for companies previously excluded from sustainable lending.

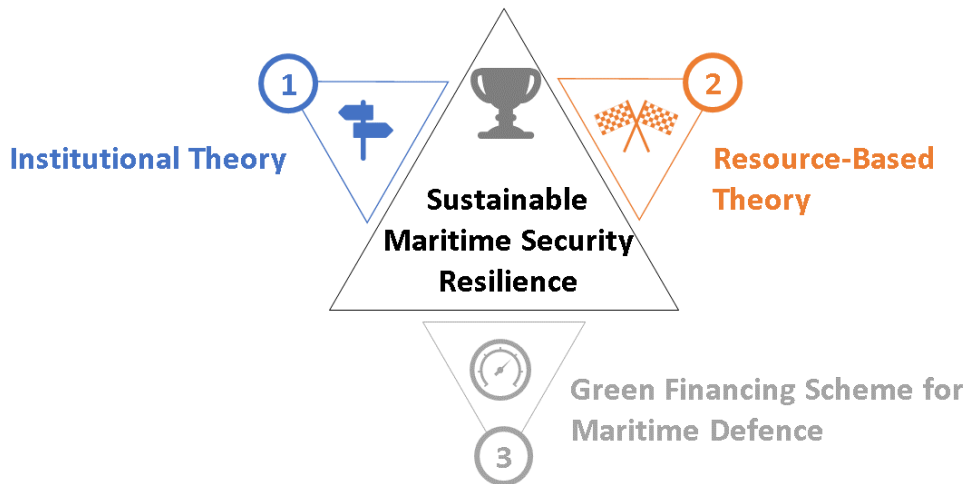
Research in maritime security resilience provides further empirical evidence for the integration of sustainability and security frameworks. Studies on Indonesia and Southeast Asia emphasize the significance of regional cooperation in combating illegal fishing, transnational crime, and ecological degradation (As'ad & Nafilah, 2022; Irianto & Sutrisno, 2024). Empirical studies confirm that threats involving illegal fishing, climate variability, and ecological disruption significantly undermine economic livelihoods and maritime sovereignty (Agnew et al., 2009; Chapsos & Malcolm, 2017; Lindley, 2020). The concept of the Blue Economy has gained traction as a strategic response to these threats, linking marine sustainability with national security (Satizábal et al., 2020; Voyer et al., 2018). Furthermore, legal frameworks, including UNCLOS, have been identified as both enablers and constraints in advancing maritime resilience strategies (Song et al., 2022). The European Union's maritime strategy provides additional evidence of the economic-security nexus by promoting safe maritime corridors as instruments of geopolitical stability (Rodríguez et al., 2024).

Together, these empirical findings reinforce the relevance of ESG integration in defence and finance, while also confirming the multidimensional nature of maritime security in the Indo-Pacific. The convergence of environmental, institutional, and legal factors within real-world case studies supports the feasibility of implementing sustainable defence financing models at both national and regional levels.

Research Concept Framework

This research builds on the premise that sustainable defence financing represents the convergence of two strategic domains: maritime security and green finance. In the

Indo-Pacific region, where geopolitical tensions and ecological risks are both pronounced, an integrated approach across sectors and national boundaries is essential. To structure this perspective, the conceptual framework draws on two core theories: Institutional Theory and the Resource-Based Theory. These theoretical foundations underpin the analytical model illustrated as follows:



Source: From various sources that have been processed

Figure 1. Research Conceptual Framework

Figure 1 illustrates the conceptual framework of this research, which integrates four key components. Institutional Theory explains how international norms, regional frameworks, and funding institutions influence the adoption of green finance in maritime security policies. Resource-Based Theory emphasizes the significance of internal capacities, including technological assets, human resources, strategic partnerships, and defense infrastructure, in facilitating the effective implementation of sustainable financing strategies. The green financing scheme represents the intersection of external pressures and internal capabilities, with a focus on financial instruments including green bonds, ESG-based lending, and blended financing mechanisms. This integration is expected to lead to sustainable maritime security resilience, characterized by defense systems that respond effectively to conventional threats while remaining adaptable to environmental and social challenges.

METHODS

Research Design

This study adopts a descriptive qualitative design to explore the integration of defence financing with green finance principles within the maritime security framework of the Indo-Pacific. This approach enables the examination of a complex and under-researched issue by interpreting policy documents, institutional frameworks, and scientific literature from a geopolitical and ecological perspective (Nugroho et al., 2023). Rather than testing hypotheses statistically, this study aims to build a conceptual understanding through the analysis of secondary data across defence, finance, and environmental sectors.

Data Collection Sources and Techniques

Data were gathered through a systematic desk study involving literature reviews, content analysis of policy documents, and thematic classification. The inclusion criteria included primary sources from official institutions and reputable journals, relevance to green finance or maritime defense, and publication dates within the last five to ten years to ensure currency and credibility.

Research Procedure and Analytical Flow

This study adopted a five-stage qualitative procedure to ensure methodological rigour and thematic relevance. The process began with problem mapping and the formulation of research objectives to refine the scope following gaps identified in academic literature and policy on sustainable defence financing in the Indo-Pacific. A structured desk study was then conducted, involving the collection of academic publications, official reports, and policy documents that met pre-established inclusion criteria. The data were then organised and coded into thematic categories related to green finance mechanisms, defence sector adaptation, and maritime resilience. A thematic analysis was applied to interpret emerging patterns, guided by Institutional Theory and Resource-Based Theory. The analysis focused on three core aspects: implementation strategies for sustainable defence financing, integration challenges and potential improvements, and the contribution of institutional actors. Validity was strengthened through triangulation by cross-referencing multiple sources and perspectives. The final stage integrated these findings into a conceptual model that illustrates the dynamic relationship between internal capabilities and external institutional drivers.

RESULT AND DISCUSSION

Strategies for implementing green defense financing in the Indo-Pacific Region

The implementation of green defence financing in the Indo-Pacific reflects a strategic response to intersecting geopolitical tensions, environmental degradation, and the global energy transition. Drawing upon Institutional Theory and Resource-Based Theory, this study explains how external normative pressures and internal capabilities shape sustainable defence strategies. Institutional Theory highlights how countries face increasing demands from international frameworks and agreements, including the Paris Agreement and the Sustainable Development Goals, to incorporate environmental considerations into defence policy (Prantl & Goh, 2022). This compels Indo-Pacific states to pursue legitimacy through mechanisms like green bonds and eco-conscious military infrastructure. In parallel, Resource-Based Theory outlines how internal capabilities, including low-emission technologies, strategic partnerships, and defence R&D investment, provide a competitive edge (Costa et al., 2012; Hitt et al., 2015). Practical implementation requires regulatory reform, financing innovation, technological advancement, regional diplomacy, and robust monitoring mechanisms. Countries like Japan and Australia exemplify early movers in institutionalising ESG standards within defence. The synthesis of these two theoretical lenses demonstrates that sustainable defence financing must be both adaptive to global expectations and rooted in local capacity building to reinforce maritime security resilience.

Challenges and opportunities for green finance integration in the defence sector in the Indo-Pacific Region

Integrating green finance into the defence sector in the Indo-Pacific presents both complex challenges and strategic opportunities in advancing maritime security resilience. The region is facing growing geopolitical tensions and ecological threats from climate change and marine resource degradation (Dutra et al., 2019; Potts et al., 2016). Institutional Theory suggests that the primary barrier lies in the limited internalization of sustainability norms within defense institutions, which have historically operated with low transparency and minimal accountability for environmental impacts. Many Indo-Pacific states lack specific regulations that incorporate ESG standards into their defence procurement, infrastructure, or operations. Global frameworks, including the Paris Agreement and the Sustainable Development Goals, impose growing normative pressure on governments; yet, these standards have not been fully translated into tangible national defense policies within the region. Fragmentation among ministries and weak coordination with financial actors further impede cross-sectoral integration. Nonetheless, examples from Japan and Australia demonstrate that defence can be positioned within sustainability agendas through policy innovation and regional cooperation platforms, including ASEAN and IORA. These opportunities highlight the potential for multilateral green defence financing models to gain traction.

From the perspective of Resource-Based Theory (RBT), the key challenge involves the limited technological and human resource capacity of defence institutions to adapt to sustainability imperatives. Investment in low-emission technologies, energy-efficient infrastructure, and environmental literacy among military personnel remains insufficient. Such limitations constrain the region's strategic positioning in an increasingly competitive maritime domain. Strategic collaboration with financial institutions, technology providers, and civil society presents an opportunity to leverage relational capital. Collaborative efforts can expand access to blended finance mechanisms, impact-oriented investments, and sovereign green funds. Implementing this agenda effectively requires five interlinked strategies: regulatory reform, innovative financing models, technological advancement through defence research and development, alignment of regional diplomatic frameworks, and evaluation mechanisms based on ESG principles. Resolving inter-agency fragmentation and the lack of fiscal incentives requires institutional transformation and targeted capacity development. Linking Institutional Theory and RBT strengthens both external legitimacy and internal competence, thereby establishing a solid basis for sustainable defence financing that unites security priorities with environmental responsibility across the Indo-Pacific.

The role of institutional actors in realising sustainable defence financing

Sustainable defence financing represents a strategic concept shaped by the increasing global emphasis on environmental sustainability, while simultaneously responding to contemporary security challenges that surpass traditional military concerns (Coccia, 2015; Martin et al., 2019). In the geopolitically complex and ecologically vulnerable Indo-Pacific region, integrating the defense sector with green finance principles requires the collaborative and simultaneous involvement of various institutional actors. The role of institutional actors is crucial in initiating, facilitating, and implementing financing strategies that are not only defensive but also responsive to

climate change, marine environmental degradation, and economic inequality, all of which can potentially become new sources of conflict.

In understanding the contribution and dynamics of these institutions, Institutional Theory becomes the primary conceptual framework explaining how normative, regulative, and cognitive pressures from the external environment affect organisational behaviour, particularly within state and defence institutions. Institutional Theory emphasises that considerations of efficiency do not merely drive the adoption of innovations in green defence finance, but also the aspiration of institutions to attain legitimacy in the eyes of the international community. According to Kaltenborn et al. (2021), international institutions and multilateral forums are increasingly exerting pressure on countries within the Indo-Pacific to integrate ESG (Environmental, Social, Governance) principles into their defense policies. Institutional actors, including national governments, defence institutions, financial authorities, regional organisations exemplified by ASEAN, and international civil society networks, strategically influence the formation of norms and policy frameworks. The national government functions as the primary decision-maker for policy orientation and budget allocation through its defence and finance ministries. However, these decisions are heavily influenced by global policy frameworks, including the Paris Agreement, UNDP guidance documents, and public demand for accountability concerning the ecological impact of military activities. As noted by Prantl & Goh (2022), contemporary defence policy is inseparable from complex and multilevel systemic pressures, necessitating strategies that are inclusive and adaptive to evolving global dynamics.

Conversely, Resource-Based Theory (RBT) in this study emphasises the internal dimensions of institutions. RBT posits that institutions can build a competitive advantage through the strategic utilisation of internal resources, including human capital, technological capabilities, collaborative networks, and managerial effectiveness. Within sustainable defence financing, institutional actors, including national development banks, pension fund managers, and military research institutes, serve as catalysts for capability development. Efforts encompass the deployment of low-emission military technologies, the establishment of environmentally sustainable bases, and the operation of maritime surveillance systems powered by renewable energy sources. A notable example of resource integration aligned with institutional pressure is reflected in the Green Port and Green Patrol Vessel initiatives developed by Japan and Australia. Despite pursuing strong geopolitical defense objectives, both states have successfully integrated ecological considerations into their defense systems, thereby strengthening security diplomacy through environmentally oriented soft power. Wallace (2019) refers to this model as strategic contrast, suggesting that influence stems not solely from hard power, but also from the capacity to mobilize internal resources to foster sustainable and positive influence.

Furthermore, interactions among institutional actors are inherently non-linear. They involve negotiations, strategic alliances, and conflicts of interest that must be managed with diplomatic sensitivity. For instance, Wirth & Jenne (2022) in *Contemporary Security Policy* argue that the Indo-Pacific's current regional order is experiencing a crisis of legitimacy concerning the traditional multilateral framework. Consequently, regional platforms including ASEAN, the Quad, and other Indo-Pacific forums function as strategic conduits for fostering dialogue between dominant powers and emerging states. Within the logic of Institutional Theory, this represents a process of isomorphism, where

countries adjust to global norms to maintain regional legitimacy. Moreover, the defence sector has traditionally demonstrated limited public transparency and accountability; therefore, the involvement of non-governmental organisations and international monitoring bodies, including the ICRC, becomes essential in promoting awareness of sustainability and fostering prudence in defence policymaking. The ICRC, for instance, highlights how conflict and climate change exert mutually reinforcing effects, thus making intersectoral collaboration all the more urgent. Hence, sustainable defence financing in the Indo-Pacific constitutes not only a technocratic undertaking but also a complex institutional challenge requiring synergy among actors with divergent mandates, capacities, and interests. Institutional Theory clarifies how external pressures shape institutional behaviour, while Resource-Based Theory elucidates how internal capabilities can be harnessed for adaptation and resilience. Together, these frameworks provide a robust analytical foundation for explaining the strategic role of institutional actors in delivering defense financing that is not only robust but also environmentally responsible and socially inclusive.

CONCLUSION

This research confirms the importance of integrating defense and green finance in realizing sustainable maritime security resilience in the Indo-Pacific region. This approach is not only a response to military threats, but also an answer to ecological challenges and global demands on sustainability. Institutional Theory explains how external pressures, including international norms and multilateral regulations, influence institutional transformation within defence strategies. Meanwhile, Resource-Based Theory provides a perspective on the importance of internal capabilities, technology, HR, and partnership networks as determinants of the success of green financing strategies in the defense sector. However, the study has limitations, as it relies entirely on secondary data and does not involve field studies or interviews with policy actors. Additionally, not all countries in the Indo-Pacific have fully accessible data on defense financing disclosure, which could limit the generalizability of the findings.

The theoretical implication of this study is to strengthen the literature on green defense finance as a new domain in security and sustainability studies, which needs to be studied more broadly within a cross-disciplinary framework. The practical implications include the importance of building the internal capacity of defence institutions to manage sustainable finance and the need for collaboration with the financial and environmental sectors. Meanwhile, the policy implications lie in the urgency of establishing a regulatory framework that governs sustainable defense financing and provides fiscal incentives for green innovation in the military sector. Further research is encouraged to conduct comparative studies among Indo-Pacific countries to examine variations in the application of green defence financing, along with an in-depth analysis of innovative financing mechanisms, including blended finance models and state-backed green defence funds.

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