
INSTITUTIONAL FRAGMENTATION AS GOVERNANCE GAP: WHY INDONESIA HAS NOT ESTABLISHED A MARITIME FUSION CENTER IN THE ERA OF AI-AUGMENTED GIS

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Abstract

This study examines why Indonesia has not yet established a maritime fusion center in the era of AI-augmented GIS, despite facing critical maritime security threats such as IUU fishing, piracy, and cyber risks. Using a qualitative comparative case study design with a most-different systems approach, the research contrasts Indonesia with Singapore's ReCAAP Information Sharing Centre (ISC). The analysis is triangulated through three theoretical frameworks: Kettl's (2006) institutional fragmentation typology, McConnell's (2010) policy failure framework, and Provan & Kenis's (2007) network governance typology. The findings reveal that the absence of a maritime fusion center is not primarily a technological or budgetary failure but a governance failure. Indonesia's maritime security architecture exhibits structural, informational, and political fragmentation that are mutually reinforcing. Bakamla operates as a coordinator without binding authority, whereas Singapore's ISC functions as a network administrative organization (NAO) with a clear mandate. The most binding constraint is political fragmentation—agencies defend information monopolies protected by legal ambiguity and lack of presidential-level political will. The study concludes that incremental technology-first approaches will fail; prior institutional reforms are necessary, including a presidential decree mandating data sharing, amendments to conflicting laws (UU No. 32/2014 and UU No. 34/2004), a maritime data governance framework, and ratification of the ReCAAP agreement.

INTRODUCTION

A strange mismatch sits at the center of today's ocean security efforts. While artificial intelligence paired with mapping tools now lets governments spot hidden ships, catch fake signal tricks, or track unlawful fishing almost instantly, those who need such power most often lack the systems to use it effectively. Far from a flaw in engineering, this gap stems from how authority is structured. Tools already exist; what blocks progress is the absence of organizational setups able to apply them widely. What we call the split-tech dilemma

arises when broken governance creates strong need for unified sea monitoring - yet also prevents exactly that outcome.

Nowhere does this contradiction stand out more than in Indonesia, the vast island chain stretching across the Indo-Pacific. With nearly seventeen thousand islands under its authority, it oversees around 5.8 million square kilometers of ocean space - home to key global passages like the straits of Malacca, Sunda, and Lombok (Bateman, 2011). These waters see intense movement, both commercial and military, making oversight critical. In fact, illegal fishing plagues much of its exclusive economic zone, costing upwards of three billion U.S. dollars each year (Guenard, 2021). Tensions rise further in the North Natuna Sea, where ships from China's coast guard regularly enter areas Jakarta claims as sovereign. Such incidents demand fast, coordinated responses through shared data systems. Still, after years of discussion and stated goals, there remains no unified hub for maritime intelligence - one that links agencies and delivers timely alerts on threats at sea. Missing from current discussions is any solid explanation rooted in Indonesia's maritime security research - research focused almost entirely on enforcement strength, navy upgrades or deals between countries. (Febrica, 2017; Sukma, R, 2011)). What the literature has systematically neglected is the institutional governance dimension: the question of whether Indonesia's administrative architecture is configured in a way that makes integrated maritime domain awareness organizationally possible at all, irrespective of the technology available to it. This article addresses that gap directly.

The first is Kettl, (2006) institutional fragmentation framework, which provides the primary analytical architecture. Kettl identifies three analytically separable dimensions of fragmentation in complex governance systems: structural fragmentation (the distribution of mandates across separate organizational units), informational fragmentation (the non-interoperability of data systems across agencies), and political fragmentation (the reproduction of competitive rather than cooperative inter-agency incentives). In the United States context, Kettl applied this framework to explain why boundary-spanning problems counterterrorism, emergency management, environmental regulation consistently out of space the governance arrangements designed to address them.

This article applies the same framework to Indonesia's maritime security architecture, arguing that all three dimensions of fragmentation are simultaneously present and mutually reinforcing, producing a governance configuration that structurally precludes the establishment of an effective fusion center regardless of available technological resources. The second theoretical pillar is McConnell, (2010) policy failure typology. McConnell distinguishes between process failure (deficiencies in how a policy is designed and legitimated), program failure (deficiencies in how a policy is implemented and operationalized), and political failure (deficiencies in how a policy is received, sustained, and institutionally embedded). This typology is analytically important for this study because it allows precise diagnosis of where, in the policy lifecycle, Indonesia's maritime governance initiatives break down. As this article demonstrates, Indonesia's failures are primarily located at the process and political dimensions: aspirational legislation and policy documents exist (Perpres No. 16/2017; UU No. 32/2014), but they are not accompanied by operationalization mechanisms, enforcement mandates, or executive-level political commitment sufficient to override entrenched agency autonomy. Conflating these failure types, as much of the Indonesian maritime policy literature implicitly does, produces misdiagnosis and consequently misdirected reform recommendations. The third pillar is Provan & Kenis, (2007) network governance typology, which classifies inter-organizational networks according to their governance structure: participant-governed networks (in which member agencies self-coordinate),

lead organization-governed networks (in which one member agency assumes informal authority), and network administrative organization (NAO)-governed networks (in which a dedicated external body coordinates the network as a whole). This framework is applied comparatively to explain a specific puzzle: why Singapore's ReCAAP Information Sharing Centre (ISC) functions as an effective regional maritime intelligence architecture while Indonesia's nominally equivalent coordinating body, Bakamla, fails to achieve equivalent integration domestically. The answer, this article argues, lies not in resource or capacity differences alone, but in the fundamental difference between Bakamla's legal status as a coordinator without enforcement authority and the ReCAAP ISC's design as a purpose-built NAO with a clear mandate, member-state buy-in, and an institutional charter that explicitly supersedes agency-level sovereignty claims within the network.

The triangulation of these three frameworks is not additive each framework is applied to a distinct causal layer of the governance gap. Kettl diagnoses the structural configuration; McConnell identifies where in the policy lifecycle failure occurs; and Provan and Kenis explain why network-level coordination specifically fails even when coordination is nominally mandated. Together, they provide a multi-layered explanatory account that no single framework could generate independently

The triangulation of these frameworks allows for a layered causal analysis: Kettl identifies structural pathologies, McConnell locates failure points in the policy process, and Provan & Kenis explains the collapse of coordination despite nominal mandates. Together, they yield an explanatory depth unattainable through any single lens. The central research question is: Why has Indonesia failed to establish a maritime fusion center in the age of AI-augmented GIS, and what institutional conditions account for this gap relative to Singapore's ReCAAP ISC? Two subsidiary questions follow: (1) Which dimension of institutional fragmentation structural, informational, or political—is the most binding constraint? And (2) What governance reforms would be necessary to render AI-GIS integration institutionally viable?

METODOLOGY

This study employs a qualitative comparative case study design, appropriate for explanatory inquiry into complex institutional, legal, and political phenomena that resist quantification (Yin, 2018). The comparative structure follows a most-different systems design (MDS), contrasting Indonesia with Singapore's ReCAAP ISC. Rather than controlling for variables, MDS leverages stark differences in political systems, territorial scale, and governance models to isolate the institutional conditions necessary for fusion center establishment (Przeworski & Teune, 1970). The comparison is configurational, not prescriptive, avoiding the pitfalls of context-insensitive policy transfer (Dolowitz & Marsh, 2000).

Analysis proceeds through theoretical triangulation across three complementary frameworks. Kettl, (2006) institutional fragmentation model serves as the primary diagnostic instrument, identifying the presence and interaction of structural, informational, and political fragmentation within Indonesia's maritime governance. McConnell, (2010) policy failure typology differentiates between legislative aspirations lacking implementation mechanisms and failures of political will—distinct issues requiring divergent remedies. Provan & Kenis, (2007) network governance typology is applied comparatively to assess why the ReCAAP ISC functions as an effective NAO while

Bakamla, despite its coordination mandate under UU No. 32/2014, lacks equivalent authority.

Three validity concerns are acknowledged. First, the absence of interview data limits access to informal governance practices, such as behind-the-scenes inter-agency negotiations or unpublished coordination efforts. This is partially mitigated through document triangulation. Second, the MDSD design limits generalizability; findings identify necessary conditions rather than universal laws. Third, the authors' affiliation with Universitas Pertahanan Indonesia introduces a potential positionality bias toward enforcement-centric conclusions. This is counterbalanced by centering civilian governance theories and deriving enforcement implications from evidence rather than assumption.

RESULT AND DISCUSSION

The Anatomy of Institutional Fragmentation in Indonesian Maritime Governance

Indonesia's maritime security architecture is distributed across no fewer than twelve agencies with overlapping jurisdictional mandates among them Bakamla, TNI-AL, Bea Cukai (Directorate General of Customs and Excise), PSDKP (Marine and Fisheries Resources Monitoring), Polairud (Marine Police), BNPT (National Counter-Terrorism Agency), and BMKG. This is not incidental duplication; it is structurally embedded in Indonesia's post-Reformasi decentralization logic, where horizontal coordination was deprioritized in favor of agency autonomy as a democratizing reform. The consequence for maritime security is a condition this article terms institutional fragmentation a governance state in which functional mandates, data systems, operational protocols, and budget lines are distributed across agencies in ways that preclude integrated situational awareness.

Fragmentation theory in public administration distinguishes between structural fragmentation (separate organizational units), informational fragmentation (non-interoperable data systems), and political fragmentation (competing institutional interests) (Kettl, 2006). Indonesia's maritime governance exhibits all three simultaneously. Structurally, no single agency holds supreme maritime authority; the 2014 Bakamla Law (UU No. 32/2014) nominally designated Bakamla as coast guard coordinator, but TNI-AL retains parallel authority under Law No. 34/2004, and PSDKP operates under the Ministry of Marine Affairs and Fisheries with its own enforcement remit creating what Tom Christensen & Per Laegreid,(2007) call "joined-up government failure," where reform intentions produce new coordination deficits rather than resolving existing ones.

Informationally, each agency maintains proprietary vessel monitoring, radar, and AIS (Automatic Identification System) databases that are not integrated at the national level. Bakamla's Maritime Information Center (Pusat Informasi Maritim) and TNI-AL's Pushidrosal operate as parallel intelligence architectures. This is directly analogous to the pre-9/11 intelligence silo problem in the United States that motivated the establishment of the National Counterterrorism Center (NCTC) and, subsequently, fusion center networks under the Information Sharing Environment (ISE) framework (Monahan & Palmer, 2009). The governance gap this creates is not merely administrative. It is operationally consequential: a vessel flagged for IUU fishing behavior in PSDKP's system cannot be automatically cross-referenced against TNI-AL's threat intelligence or Bakamla's patrol logs without inter-agency coordination requests routed through bureaucratic channels a process that may take days, defeating the real-time utility of maritime domain awareness (MDA).

Maritime Fusion Center Require and Why AI-Augmented GIS Changes the Calculus

A maritime fusion center, as conceptualized in the post-9/11 American and post-Somali piracy international frameworks, is an integrated facility for collecting, analyzing, and disseminating multi-source maritime intelligence across agencies in near-real-time (Kraska & Pedrozo, 2013). The theoretical foundation draws on network governance theory (Provan & Kenis, 2007), where complex interdependencies require a central network administrative organization (NAO) to achieve outcomes no single node can produce independently.

The emergence of AI-augmented GIS materially raises both the potential value and the institutional cost of such a center. On the value side, machine learning-enhanced GIS platforms exemplified by systems like Palantir Marine, Windward AI, or the SkyTruth Global Fishing Watch model can process AIS vessel tracks, SAR (Synthetic Aperture Radar) imagery, and behavioral anomaly indicators at scales impossible for human analysts (Kroodsma et al., 2018). Dark vessel detection, AIS spoofing identification, and pattern-of-life analysis for fishing fleet behavior all represent AI-GIS capabilities directly relevant to Indonesia's stated maritime security challenges, particularly IUU fishing and maritime boundary enforcement in the Natuna Sea and Maluku corridor.

However, the institutional cost side is equally significant and underappreciated in the Indonesian policy literature. Effective AI-augmented GIS requires: (1) a unified, clean data pipeline from multiple sensor and agency inputs; (2) interoperable data standards across contributing agencies; (3) a legal framework governing data classification, sharing, and liability between civilian and military contributors; and (4) sustained technical capacity for model maintenance and retraining. Each of these prerequisites is precisely what institutional fragmentation obstructs. The AI does not solve coordination failure it amplifies the cost of it, because a fusion model trained on incomplete, siloed data produces systematically biased situational assessments (Ribeiro et al., 2023). This creates a governance-technology paradox: the same institutional conditions that make a fusion center most necessary (high fragmentation, poor information sharing) are the conditions that make deploying an AI-GIS-powered fusion center most difficult to do well.

Explaining the Absence: A Multi-Causal Framework

The absence of a maritime fusion center in Indonesia cannot be reduced to a single variable. This analysis identifies four interacting causal mechanisms:

Jurisdictional Turf Defense

Institutional fragmentation is not merely structural inertia it is actively reproduced by agencies with vested interests in maintaining information monopolies. Bakamla's intelligence function, TNI-AL's operational sovereignty, and PSDKP's enforcement authority each represent bureaucratic capital. Sharing data with the centralized fusion architecture entails surrendering informational advantage, which threatens agency budget justifications, operational autonomy, and political positioning. This is consistent with Bardach's (1998) implementation theory, which identifies inter-agency coordination failures as a function of competitive rather than cooperative institutional incentives.

This dynamic was visible in the troubled history of the Sisnas MTA (Sistem Informasi Nasional Maritim Terintegrasi Terpadu Antarlembaga) initiative, which aimed to integrate maritime data across agencies but has faced persistent adoption resistance less from technical incompatibility than from institutional unwillingness to subordinate agency data sovereignty to a shared architecture. Dalam perspektif lingkungan strategis, kondisi keamanan maritim Indonesia sangat dipengaruhi oleh dinamika global yang kompleks. Rivalitas geopolitik di kawasan Indo-Pasifik, meningkatnya aktivitas militer negara besar, serta ketergantungan ekonomi global pada jalur laut menjadikan wilayah perairan

Indonesia sebagai area yang sangat strategis sekaligus rentan (Till, 2018). Situasi ini memperkuat urgensi penguatan sistem keamanan maritim nasional yang lebih adaptif dan berbasis teknologi.

Regulatory Ambiguity and Legal Gaps

Indonesia lacks a comprehensive data governance framework for classified maritime intelligence sharing. The existing legal architecture — UU No. 14/2008 on Public Information Openness, UU No. 17/2011 on State Intelligence, and UU No. 32/2014 on Bakamla — creates jurisdictional ambiguity rather than a clear sharing protocol. TNI-AL data, classified under defense secrecy provisions, cannot be legally integrated with PSDKP fisheries enforcement data under current frameworks without specific enabling legislation or a presidential regulation (Perpres) designating an authorized integrator. This regulatory gap is a necessary condition for the fusion center's absence, not merely a facilitating one.

4.3.3 Weak National-Level Political Mandate

The establishment of a maritime fusion center would require a presidential-level political decision to designate an authoritative coordinating architecture, override existing agency autonomy, and allocate sustained multi-year budget none of which has occurred. Perpres No. 16/2017 (Indonesian Ocean Policy) and the National Action Plan for Maritime Security contain aspiration language about integrated maritime surveillance but lack institutional operationalization mechanisms. Policy aspirations without enforcement mandates are, as McConnell, (2010) argues in policy failure theory, a distinct category of output failure of policies that are articulated but never implemented, often because the coordination cost exceeds political will.

Technical Capacity and Absorptive Capacity Gaps

Even if political will and legal frameworks were resolved, Indonesia's current technical infrastructure presents a binding constraint. The absorptive capacity to operate an AI-augmented fusion center including data science personnel, validated training datasets for Indonesian maritime patterns, cybersecurity infrastructure for multi-agency data integration, and GIS platform licensing is not currently present at the required scale within any single agency. Bakamla's operational budget remains structurally limited relative to its mandate; TNI-AL's digital modernization (Alpalhankam) programs are defense-classified; and PSDKP's VMS (Vessel Monitoring System) infrastructure, while technically functional, was not designed for AI integration or cross-agency data contribution.

Comparative Perspective: What Indonesia Can Learn and Why Direct Transfer Fails

The United States fusion center model (post-2003), the EU Maritime Safety Agency (EMSA) CleanSeaNet SAR-AIS integration, and the Regional Cooperation Agreement on Combating Piracy and Armed Robbery Against Ships in Asia (ReCAAP, 2023) ISC in Singapore all represent operational models of maritime information integration. However, each emerged from specific political-institutional conditions that differ fundamentally from Indonesia's context. The ReCAAP model is instructive for its limitations: Indonesia is the only major Southeast Asian maritime nation that has not ratified the ReCAAP agreement, limiting bilateral data sharing precisely where it would be most operationally relevant. This non-ratification reflects not technical incapacity but political sensitivity about sovereignty a dynamic that would similarly constrain any domestic fusion center that required military data disclosure to civilian or inter-agency bodies. This suggests that Indonesia's governance gap cannot be resolved through technology adoption or organizational mimicry alone. What is required is prior institutional reform: a legally mandated data-sharing framework, a designated lead agency with genuine authority (not merely coordination responsibility), and a political decision at the executive level to accept the sovereignty trade-offs that integrated maritime awareness requires. AI-augmented GIS

is an enabler, not a solution, to a problem that is fundamentally political-institutional in nature.

Theoretical Synthesis: Institutional Fragmentation as a First-Order Constraint
Drawing together the preceding analysis, this article argues that institutional fragmentation functions as a first-order constraint on maritime fusion center development that meaning it is not one among several equally weighted barriers, but a structural condition that mediates all others. Technical capacity gaps exist partly because fragmentation prevents resource pooling. Legal ambiguity persists partly because no agency has sufficient authority and interest to lead legislative reform. Political will is suppressed partly because the coordination cost appears prohibitive in a fragmented landscape. This has direct implications for policy. Incremental technology-first approaches deploying AI tools within existing agency siloes will not aggregate into integrated maritime domain awareness. The governance architecture must precede, or at minimum co-evolve with, the technological investment. Indonesia's experience illustrates a broader theoretical point from Kettl, (2006) in fragmented governance systems, technology adoption scales the existing coordination failure rather than resolving it

Recommendations

This article set out to explain why Indonesia has failed to establish a maritime fusion center in the era of AI-augmented GIS, and what institutional conditions account for this governance gap relative to Singapore's ReCAAP Information Sharing Centre (ISC) model. The analysis was structured through three theoretical frameworks Kettl, (2006) institutional fragmentation typology, McConnell, (2010) policy failure framework, and Provan & Kenis, 2007 network governance typology applied to a comparative case study contrasting Indonesia and Singapore across six governance dimensions.

The principal finding is unambiguous: Indonesia's failure to establish a maritime fusion center is not primarily a technological or budgetary failure. It is a governance failure, rooted in three mutually reinforcing institutional conditions that together constitute what this article has termed the fragmentation-technology paradox. First, Indonesia's maritime security architecture exhibits all three dimensions of institutional fragmentation identified by Kettl, (2006) structural, informational, and political simultaneously and in a mutually reinforcing configuration. Twelve agencies share overlapping maritime mandates without a legally empowered coordinating authority capable of overriding agency-level data sovereignty claims. Second, Indonesia's maritime policy instruments most notably Perpres No. 16/2017 and UU No. 32/2014 exhibit the process and political failure characteristics identified by McConnell, (2010): they articulate governance ambitions without providing operationalization mechanisms, enforcement mandates, or executive-level political commitment sufficient to overcome entrenched bureaucratic resistance. Third, Bakamla's governance architecture corresponds to a lead organization-governed network in Provan & Kenis, (2007) typology a model that systematically underperforms relative to NAO-governed networks in contexts of high inter-agency interdependence and contested authority, precisely the conditions that define Indonesia's maritime security landscape.

The comparative analysis with Singapore's ReCAAP ISC illuminates these findings through contrast. Singapore's success is not attributable to its small size or resource advantages alone it is attributable to the institutional design of the ISC as a purpose-built NAO with a clear statutory mandate, member-state buy-in across jurisdictions, and an operational charter that explicitly positions the ISC above agency-level sovereignty claims within the information-sharing network. The ISC does not merely coordinate; it governs.

Bakamla, by contrast, coordinates in name but lacks the legal authority, budget independence, and political backing to govern in practice. This distinction is not semantic it is the structural reason why one architecture produces integrated maritime domain awareness and the other does not. These findings confirm both subsidiary research questions. Regarding the first which dimension of fragmentation is most binding the analysis identifies political fragmentation as the proximate constraint: it is the competitive reproduction of agency information monopolies, protected by legal ambiguity and sustained by the absence of presidential-level political will to override them, that prevents structural and informational integration from occurring even where technical solutions exist. Regarding the second what governance conditions would need to change the analysis points to three necessary prior conditions: a legally binding inter-agency data sharing mandate with enforcement consequences; a restructured Bakamla with NAO-equivalent authority; and a maritime data governance framework that resolves the current legal ambiguity between UU No. 32/2014 and UU No. 34/2004.

Theoretical Contributions Beyond the empirical findings, this article makes three contributions to the scholarly literature on maritime security governance and institutional theory. First, it introduces and operationalizes the concept of the fragmentation-technology paradox as a generalizable governance condition relevant to any institutionally complex state attempting to deploy integrated AI-surveillance architectures. The paradox that the states with the greatest MDA need are institutionally least equipped to operationalize AI-GIS at scale has not been theorized in the maritime security literature, which has treated technology adoption and institutional governance as separable rather than co-constitutive problems. This article demonstrates that they cannot be separated: technology readiness is a necessary but insufficient condition for integrated maritime domain awareness, and governance readiness is the binding prior constraint. Second, the article advances the application of Provan & Kenis, (2007) network governance typology to maritime security contexts. While network governance theory has been extensively applied in public health, environmental management, and social services, its application to security sector coordination particularly in developing-state contexts characterized by civil-military boundary ambiguity remains underdeveloped. This article demonstrates that the NAO concept provides precise analytical leverage for explaining why nominally equivalent coordinating institutions (Bakamla vs. the ReCAAP ISC) produce fundamentally different governance outcomes, and generates falsifiable propositions about the institutional conditions under which maritime information integration is achievable.

Third, the article demonstrates the analytical necessity of distinguishing between policy design failure and political mandate failure in the Indonesian maritime governance context a distinction that (McConnell, 2010) typology enables but that the existing Indonesian maritime security literature has not operationalized. The conflation of these failure types in prior scholarship has produced a persistent misdiagnosis: treating Indonesia's maritime governance gap as a legislative design problem amenable to regulatory reform, when the evidence indicates that the more binding constraint is the absence of executive-level political will to enforce existing coordination mandates against resistant agencies. This misdiagnosis has consequences for policy: it directs reform energy toward drafting new legislation when the prior necessity is political commitment to operationalize existing law.

Policy Recommendations The findings of this study generate six direct policy recommendations directed at Indonesian policymakers across Bakamla, Kementerian Pertahanan (Kemenhan), Kementerian Perhubungan (Kemenhub), and the Office of the President. These recommendations are sequenced by institutional prerequisite:

Recommendations R1 through R4 address governance architecture and must precede R5 and R6, which address technology deployment and international integration. Deploying AI-GIS infrastructure (R5) or pursuing international data-sharing agreements (R6) without first resolving the domestic governance architecture (R1–R4) will reproduce the fragmentation-technology paradox at greater cost.

Table 2. Policy Recommendations: Sequenced Institutional Reform Agenda

#	Reform Area	Specific Action	Lead Institution	Legislative Basis Required
R1	Establish a Maritime Fusion Center by Presidential Decree	Issue a Perpres designating a Maritime Fusion Center under Bakamla with mandatory data contribution from TNI-AL, PSDKP, Polairud, and Bea Cukai. The decree must include enforcement consequences for non-compliance — not merely coordination language.	Kantor Presiden, Bakamla	New Perpres; amendment to UU No. 32/2014 Art. 62–63
R2	Resolve the UU 32/2014 vs. UU 34/2004 Jurisdictional Conflict	Amend UU No. 34/2004 or issue a joint ministerial regulation (Peraturan Bersama) explicitly authorizing TNI-AL to share non-classified operational maritime data with Bakamla's fusion architecture. The current legal ambiguity gives TNI-AL de facto veto power over integration.	Kemenkumham, Kemenhan, Bakamla	Amendment to UU No. 34/2004 on Peraturan Bersama Kemenhan–Bakamla
R3	Enact a Maritime Data Governance Framework	Draft a Government Regulation (PP) under UU No. 14/2008 establishing data classification tiers, sharing protocols, liability frameworks, and inter-agency data contribution standards specifically for maritime security intelligence. Without this, any fusion center will face permanent legal exposure.	Kemkominfo, Bakamla, BIN	New PP under UU No. 14/2008; alignment with UU No. 27/2022 (Personal Data Protection)
R4	Restructure Bakamla as a Network Administrative Organization (NAO)	Redesign Bakamla's mandate from coordinator to NAO with statutory authority to direct inter-agency data contribution, set interoperability standards, and report directly to the President on MDA gaps. The current model coordinator without enforcement power is structurally equivalent to a network with no administrative center.	Bakamla, Setneg	Comprehensive amendment to UU No. 32/2014
R5	Develop a Unified AI-GIS Platform with Mandatory Agency Feeds	Commission a national maritime AI-GIS platform under Bakamla's fusion center, with mandatory AIS, VMS, and radar data feeds from all contributing agencies. Platform architecture must be designed for multi-agency data contribution from the outset — not retrofitted onto existing siloed systems. International technical cooperation with EMSA or ReCAAP ISC should be formally pursued.	Bakamla, Kemenhub, KKP, BRIN	Ministerial Decree (Permenhub + Permen KKP) mandating data feeds; budget allocation in APBN
R6	Ratify the ReCAAP Agreement	Indonesia is the only major Southeast Asian maritime nation that has not ratified ReCAAP. Ratification would immediately expand bilateral maritime intelligence sharing with Singapore's ISC, provide access to regional incident reporting infrastructure, and signal institutional credibility to international partners. Sovereignty concerns, while legitimate, have prevented a decade of potential MDA improvement.	Kemlu, Kemenhan, DPR	DPR ratification of ReCAAP Agreement (2004)

Note. APBN = Anggaran Pendapatan dan Belanja Negara (State Budget). Kemenkumham = Ministry of Law and Human Rights. Setneg = State Secretariat. BIN = State Intelligence Agency. BRIN = National Research and Innovation Agency. KKP = Ministry of Marine Affairs and Fisheries.

Two of these recommendations merit elaboration beyond the table because they are the most politically contentious and therefore the most likely to be resisted or deferred. R2 resolving the UU 32/2014 vs. UU 34/2004 jurisdictional conflict is the single most binding legal constraint on fusion center development and the one most likely to be

avoided by policymakers precisely because it requires Kemenhan and TNI-AL to accept a reduction in their informational sovereignty. The political resistance to this reform is predictable and should be anticipated rather than accommodated. Indonesia's experience with post-Reformasi civil-military relations demonstrates that institutional boundary redefinition is achievable when driven by presidential-level political commitment (as with the TNI's withdrawal from territorial functions after 2004) but stalls indefinitely when left to inter-ministerial negotiation. A Perpres mandating inter-agency data sharing that is not backed by a presidential willingness to enforce it against TNI-AL non-compliance will be, in McConnell's terms, another output failure articulated but not operationalized.

R6 ReCAAP ratification is diplomatically sensitive because Indonesia has historically framed non-ratification as a sovereignty protection measure, objecting to provisions that it perceives as permitting foreign vessels to enter Indonesian waters for counter-piracy purposes. This objection is legitimate but disproportionate to the information-sharing benefits foregone. Indonesia can ratify ReCAAP while formally registering reservations on specific operational provisions a standard mechanism in multilateral treaty practice without surrendering the core sovereignty protections it has sought to preserve. The cost of continued non-ratification, in terms of excluded maritime intelligence, exceeds the cost of ratification with reservations. That this calculus has not produced ratification in over twenty years of deliberation is itself evidence of the political fragmentation this article has analyzed: no single agency has the authority, interest, and political capital simultaneously to drive ratification through the DPR.

Three limitations guide future inquiry. First, the absence of elite interviews limits insight into informal inter-agency dynamics. Future research should employ interviews with Bakamla, TNI-AL, and PSDKP officials to uncover micro-political mechanisms sustaining data monopolies. Second, the two-case MDS design limits generalizability. Comparative studies with the Philippines, Papua New Guinea, or the Maldives could test whether the fragmentation-technology paradox is structurally recurrent or unique to Indonesia's civil-military dynamics. Third, a technical assessment of AI-GIS interoperability with Indonesia's data infrastructure is needed. Such interdisciplinary work bridging governance and maritime informatics is essential for actionable roadmaps.

CONCLUSION

Indonesia's maritime domain awareness deficit does not await a technological breakthrough. The technology is available and proven. What is lacking is a political decision to treat institutional fragmentation not as a manageable inefficiency but as a first-order security threat requiring structural resolution. This necessitates presidential recognition that integrated MDA cannot coexist with unfettered agency autonomy, unamended silo-protecting laws, or half-hearted reform agendas. The fragmentation-technology paradox will not dissipate organically. Each year without a fusion center

perpetuates billions in IUU fishing losses, unresolved boundary vulnerabilities, and delayed responses to emerging threats in the North Natuna Sea.

This article offers no facile solutions none exist. But it provides a rigorous diagnosis of the institutional pathologies and the precise reforms required. Whether this diagnosis translates into action remains a political question—one that Indonesian policymakers must ultimately confront.

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