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Legal Weaknesses and Future Restoration of the Indonesia–Singapore FIR Arrangement

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Abstract

Background: The 2022 realignment placed the relevant airspace over the Riau and Natuna Islands within the Jakarta Flight Information Region (FIR), while Indonesia continued to delegate air navigation services in Sectors A and B to Singapore from the surface to 37,000 feet. **Objective:** This article evaluates the legal weaknesses of the arrangement, examines whether formal sovereignty has become effective operational control, and formulates a legally and technically reversible restoration pathway. **Methods:** A normative-empirical legal method was applied through statutory, treaty, conceptual, historical, comparative, case, and policy approaches. Primary legal instruments, ICAO documents, court decisions, institutional reports, and peer-reviewed studies were analyzed qualitatively. **Results:** The 2022 Agreement is more operationally effective than the 1995 arrangement because it expands the Jakarta FIR, clarifies Indonesia as the delegating State, limits Singapore's services vertically, and regulates coordination and navigation charges. Nevertheless, its twenty-five-year duration, limited five-year review, broad delegated service package, data asymmetry, and absence of readiness-based transfer mechanisms create a risk of factual permanence. **Conclusion:** Delegation remains legitimate only when necessary, proportionate, accountable, transparent, and reversible. A Sovereign–Collaborative Adaptive FIR model is proposed, combining real-time data access, independent audit, civil–military oversight, shadow operations, a readiness index, and phased transfer through bilateral amendment and ICAO procedures.

Keywords: air sovereignty; effective control; Flight Information Region; functional delegation; reversibility

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INTRODUCTION

State sovereignty over airspace is a foundational rule of international air law. Article 1 of the Chicago Convention recognizes every State's complete and exclusive sovereignty over the airspace above its territory. Yet international aviation cannot be organized solely through territorial boundaries. Safety, regularity, and efficiency depend on coordinated services, common procedures, and continuous information exchange across national borders. A Flight Information Region is therefore an operational service area, not a territorial title. ICAO Annex 11 permits States to arrange the provision of air traffic services across borders by mutual agreement without diminishing the sovereignty of the delegating State [1, 2].

This distinction is central to the Indonesia–Singapore arrangement. Singapore's provision of air navigation services does not transfer Indonesian territory or extinguish Indonesia's regulatory and defense jurisdiction. Nevertheless, the service provider obtains immediate operational access to flight plans, communication, flow management, surveillance information, separation decisions, and emergency coordination. Delegation consequently produces legal, administrative, economic, and security effects even where sovereignty remains formally intact. Earlier studies have variously emphasized the difference between sovereignty and service provision, the domestic ratification controversy, the need for technical readiness, and the continuing defense implications of the 2022 arrangement [3, 4, 5, 6].

The issue has a long institutional history. Air navigation services around the Riau and Natuna Islands developed within the regional post-war aviation system and remained integrated with Singapore's traffic network. Indonesia and Singapore signed a realignment agreement in 1995, but it did not become fully operational within the regional ICAO framework. Indonesia subsequently strengthened its domestic capacity through Law Number 1 of 2009 on Aviation, the establishment of AirNav Indonesia, and the National Air Navigation Order. These instruments affirm sovereignty, recognize limited delegation, and direct the development of national service capability [7, 8, 9].

A new agreement was signed on 25 January 2022 and ratified by Presidential Regulation Number 109 of 2022. The operational realignment entered into force on 21 March 2024 at 20:00 UTC. The adjusted boundary expanded the Jakarta FIR, but Indonesia delegated services in Sectors A and B to Singapore from the surface to 37,000 feet; services above that level are provided by Indonesia [10, 11]. ICAO operational papers issued after implementation confirm that the arrangement includes coordinated service functions, including joint meteorological procedures within portions of the Jakarta FIR [12].

The new configuration therefore creates a more precise research problem than the binary question of whether Indonesia has 'taken back' its airspace. The relevant issue is the relationship between de jure sovereignty and effective control. Effective control in this article does not refer to the attribution test in the law of State responsibility. It means the practical capacity of Indonesia to know, regulate, supervise, verify, correct, protect, and ultimately replace the delegated service. This perspective allows the arrangement to be evaluated through measurable dimensions rather than symbolic claims.

The article develops three contributions. First, it conceptualizes the arrangement as functional delegation: the transfer of specified service functions

without territorial authority. Second, it formulates reversibility-by-design, meaning that the legal and operational ability to reduce or terminate delegation must be built into governance, data architecture, capacity development, and treaty review. Third, it proposes a Sovereign–Collaborative Adaptive FIR model that combines national authority with regional safety cooperation and staged transfer. The objective is to assess the legal and operational structure of the 2022 Agreement, identify its accountability and reversibility gaps, and formulate a phased governance model consistent with international aviation safety and Indonesian airspace sovereignty.

METHODS

This study uses a normative-empirical legal method. The normative component examines principles, rules, treaty clauses, institutional authority, and relationships among international and national legal sources. The empirical component is documentary rather than interview-based: it evaluates how the arrangement operates through official implementation statements, ICAO papers, institutional reports, published operational procedures, and the documented development of Indonesian air navigation capacity. This design is suitable because the principal issue is not only what the law states, but also how responsibility, information, oversight, and operational capability are distributed [13].

Seven complementary approaches were applied. The statutory approach examined Law Number 1 of 2009, Law Number 21 of 2025, Presidential Regulation Number 109 of 2022, and implementing air navigation regulations. The treaty approach examined the Chicago Convention, Annex 11, the Vienna Convention on the Law of Treaties, the 1995 Agreement, and the 2022 Agreement. The conceptual approach developed functional delegation, effective control, accountability, proportionality, and reversibility. The historical approach traced the development from regional post-war arrangements to the operational realignment in 2024. The comparative approach assessed changes between the 1995 and 2022 instruments. The case approach considered Supreme Court Decision Number 71 P/HUM/2022. The policy approach translated the findings into an institutional model and staged transition pathway.

Primary materials consisted of conventions, bilateral agreements, legislation, regulations, judicial decisions, official ICAO documents, and government implementation statements. Secondary materials included peer-reviewed journal articles and selected legal-method and aviation-law books. Sources were selected according to legal authority, relevance to the Indonesia–Singapore FIR, traceability, and—where applicable—post-2022 operational value. Journal literature was used to map competing interpretations, while official materials were treated as the principal basis for dates, legal status, and institutional responsibilities.

The materials were analyzed qualitatively through systematic, historical, teleological, and comparative interpretation. The analysis proceeded in four stages: identifying the legal object of delegation; separating sovereignty, regulatory jurisdiction, service responsibility, and operational control; testing the arrangement against necessity, proportionality, accountability, transparency, and reversibility; and formulating a governance model linked to objective readiness evidence. The study did not involve human participants, personal data, or classified operational information. Its prescriptive conclusions are therefore limited to publicly verifiable legal and institutional evidence.

RESULTS

Evolution and Legal Structure of the Realignment

The results show that the 2022 Agreement changed the legal basis and operational configuration of the relationship more significantly than the 1995 arrangement. The 1995 instrument sought to realign the boundary and preserve Singapore's service role in specified areas, but it did not achieve full international and operational implementation. Its failure demonstrates that bilateral consent alone is insufficient when changes affect regional routes, adjacent FIRs, aeronautical information, technical coordination, and the ICAO air navigation planning system [14, 15, 16].

By contrast, the 2022 Agreement was incorporated into domestic law through Presidential Regulation Number 109 of 2022, coordinated through bilateral and regional procedures, and operationalized in March 2024. The legal position of Indonesia became clearer: the adjusted airspace is within the Jakarta FIR, and Singapore acts as the recipient of delegated service functions. The Agreement also defines vertical limits, operational coordination, State-aircraft arrangements, navigation charges, and associated service responsibilities. Official post-implementation materials show that the new system is active rather than merely declaratory [11, 12].

The adjustment nevertheless did not transfer every operational function to Indonesia. Delegation in Sectors A and B extends from the surface to 37,000 feet, a layer used intensively by commercial traffic approaching and departing Singapore and neighboring airports. The arrangement therefore separates formal FIR responsibility from daily operational service in the delegated layer. This separation is lawful in principle under Annex 11, but its institutional quality depends on the limits and safeguards surrounding the delegation.

Table 1. Principal Differences Between the 1995 and 2022 FIR Arrangements

Aspect	1995 arrangement	2022 arrangement
Operational status	Did not achieve full international and operational implementation.	Entered into force operationally in March 2024 after domestic, bilateral, regional, and aeronautical procedures.
Position of Indonesia	Realignment was agreed, but the previous service configuration largely continued.	Relevant airspace is placed in the Jakarta FIR; Singapore is expressly positioned as the recipient of delegation.
Vertical design	Sector A to FL 370; Sector B was not clearly limited vertically in the earlier design.	Sectors A and B are delegated from the surface to 37,000 feet; Indonesia provides services above that level.

Aspect	1995 arrangement	2022 arrangement
Delegated functions	Less detailed and never fully operationalized.	Integrated package including ATS, ATFM, AIS, airspace management, telecommunications, meteorology, and supporting emergency coordination.
Duration and review	No effective operational term resulted.	Twenty-five-year term; five-year review is operationally useful but does not itself redesign the delegated sectors or term.
Accountability	Relied heavily on diplomacy and legacy practice.	More explicit coordination, but data access, independent audit, and structural correction remain incomplete.

Source: Compiled from the 1995 Agreement, the 2022 Agreement, Presidential Regulation Number 109 of 2022, Supreme Court Decision Number 71 P/HUM/2022, and official implementation materials.

Functional Delegation and Effective-Control Dimensions

The legal object transferred to Singapore is a package of service functions rather than sovereign authority. Functional delegation can be understood through four layers. The first is territorial sovereignty: Indonesia retains original authority over its national airspace. The second is regulatory jurisdiction: Indonesia remains competent to legislate, establish restricted areas, protect defense interests, and enforce national law. The third is service responsibility: the Jakarta FIR remains an Indonesian responsibility within the ICAO framework. The fourth is operational control: specified daily service functions are performed through Singapore's personnel, systems, procedures, and control center within the delegated sectors.

This four-layer model clarifies why two extreme positions are both incomplete. Treating foreign service provision as a transfer of sovereignty ignores the legal distinction between territory and navigation services. Conversely, treating the FIR as entirely unrelated to sovereignty ignores the practical importance of information, instructions, surveillance, emergency response, and military coordination. The literature consistently shows that airspace sovereignty becomes effective only when supported by institutional capacity and operational access [18, 19, 20].

The study identifies seven effective-control dimensions: normative control, information control, operational influence, institutional oversight, technological independence, defense coordination, and transition capacity. Indonesia does not need to perform every function directly at every moment to exercise effective control. It must, however, possess sufficient data, audit rights, corrective authority, contingency capability, and a credible alternative system. The most significant weaknesses arise where Indonesia remains legally responsible but lacks equivalent operational visibility or the practical means to alter the arrangement.

Table 2. Effective-Control Gaps and Required Safeguards

Dimension	Observed gap	Required safeguard
Normative control	Indonesia retains legal authority, but treaty obligations constrain unilateral operational change.	A clear amendment pathway, trigger-based consultation, and harmonized domestic implementing rules.
Information control	Primary operational data and records originate in the service provider's systems.	Real-time data mirror, historical record access, retention standards, and independent verification.
Operational influence	Daily separation, flow, and communication decisions are made by the delegated provider.	Joint procedures, defined escalation rights, Indonesian liaison personnel, and measurable service-level obligations.
Institutional oversight	Multiple agencies create fragmented responsibility and a problem of many hands.	A national FIR governance council, regulator–operator separation, audit protocols, and a single accountability matrix.
Technological independence	Integrated systems and procedures increase switching costs.	Interoperable national systems, cyber-resilient backup, simulation, and tested parallel operation.
Defense coordination	Civil aviation efficiency and State-aircraft requirements may follow different priorities.	Permanent civil–military coordination, priority rules, secure channels, and incident review.
Transition capacity	Technical readiness does not automatically create a contractual right to reduce delegation.	Readiness index, phased sunset by function or layer, safety case, and bilateral/ICAO approval process.

Source: Analytical construction based on Annex 11, the 2022 Agreement, Indonesian airspace legislation, and the reviewed legal literature.

Accountability, Review, and the 2025 Airspace Management Law

The third result concerns the relationship between duration, review, and reversibility. The Agreement operates for twenty-five years and permits review at five-year intervals. Review can improve coordination and procedures, but it does not automatically reduce the delegated area, change its vertical dimensions, or shorten the treaty term. There is no direct readiness-based transfer clause connecting objective Indonesian capacity—such as surveillance availability, controller ratings, sector capacity, successful simulation, or parallel operations—to a mandatory reduction in delegation. As a result, technical progress and treaty rights may develop on separate tracks.

Data asymmetry is a related structural issue. The provider that operates the service obtains first-hand access to flight plans, communication recordings, flow restrictions, incident data, capacity calculations, and system outages. If Indonesia receives only selected reports, it may remain politically and legally accountable without equivalent means to verify performance. A robust arrangement therefore requires real-time and historical data access, clearly defined record retention, audit rights, cyber-security controls, incident investigation procedures, and the ability to require corrective action. [3] similarly identify unresolved questions concerning the distribution of responsibility for services delivered by Singapore.

Law Number 21 of 2025 on Airspace Management strengthens the domestic framework after the realignment became operational. It reaffirms full and exclusive sovereignty and defines airspace management as integrated planning, utilization, control, and supervision. It also links airspace use to aviation, defense and security, the national economy, and civil–military coordination [20]. The statute does not, however, automatically amend the 2022 Agreement. Under pacta sunt servanda, bilateral obligations remain binding until they are amended, replaced, or terminated by lawful means [21]. The law's principal contribution is therefore to provide a stronger domestic basis for integrated oversight, institutional coordination, and a future evidence-based negotiating position.

DISCUSSION

Legitimacy of Delegation: Beyond Formal Sovereignty

The findings suggest that the legality of cross-border air navigation delegation cannot be assessed solely by asking whether territorial sovereignty has formally changed. Annex 11 permits delegation, and the 2022 Agreement clearly preserves Indonesia's sovereign title. The more demanding question is whether the delegation remains necessary, proportionate, accountable, transparent, and reversible throughout its life. These criteria convert a broad assertion of sovereignty into an evaluative framework capable of guiding institutions and negotiations.

Necessity requires a demonstrable operational reason for the delegated function, such as traffic complexity, proximity to Changi, short transfer distances, regional route integration, or continuity of established procedures. Proportionality requires the geographic area, vertical layer, functional scope, and duration to remain no broader than the verified operational need. Accountability requires access to information, reasons, audit findings, corrective measures, and clear responsibility for incidents. Transparency requires differentiated disclosure: operationally sensitive information may remain protected, but regulators, auditors, and legislative oversight bodies need sufficient access to evaluate safety, revenue, and national-capacity progress. Reversibility requires a lawful and tested pathway for the gradual return of functions.

The 2022 Agreement performs relatively well on formal clarity and operational continuity, but less well on structural reversibility. Its twenty-five-year duration is not unlawful. The risk arises when the period is combined with a review mechanism that cannot itself redesign the delegation and with no automatic connection between improved Indonesian capability and reduced reliance on Singapore. In this configuration, a temporary delegation can become factually durable because systems, personnel experience, airline expectations, and regional procedures continuously

reinforce the incumbent provider. [6, 22, 23] approach this concern from different legal perspectives but converge on the need to reconcile safety with more substantive Indonesian control.

Reversibility-by-Design and the Sovereign–Collaborative Adaptive Model

Reversibility-by-design addresses factual permanence by treating return of function as a normal governance outcome rather than an exceptional diplomatic crisis. It has at least seven dimensions. Legal reversibility requires amendment, partial transfer, or termination mechanisms. Technical reversibility requires interoperable systems and an operational backup. Operational reversibility requires simulations, shadow operations, parallel operations, contingency procedures, and validated handover points. Institutional reversibility requires a capable regulator and coordinated civil–military governance. Data reversibility requires Indonesia to control the information necessary to continue the service. Fiscal reversibility requires sustainable funding for staffing, infrastructure, and system maintenance. Diplomatic reversibility requires acceptance by Singapore, affected neighboring FIRs, airspace users, and ICAO processes.

The proposed Sovereign–Collaborative Adaptive FIR model avoids two extremes. Immediate full takeover can create unnecessary transition risk if readiness has not been demonstrated. Indefinite technical dependence can preserve short-term stability while weakening incentives to develop an alternative. The model is sovereign because Indonesia retains regulatory authority, defense control, data rights, audit rights, and strategic direction. It is collaborative because safe regional aviation requires continuing cooperation with Singapore, Malaysia, ICAO, airlines, airports, meteorological authorities, and search-and-rescue institutions. It is adaptive because the delegated package may be reduced by function, layer, time, or sector as objective capacity and traffic conditions change.

At the institutional level, Indonesia should establish a National FIR Management Council through a presidential regulation or equivalent instrument. The council should not replace the technical regulator or AirNav Indonesia. Its function should be to integrate policy, defense, technical readiness, finance, diplomacy, cyber security, and public accountability. Membership should include the Ministry of Transportation, the Ministry of Defense, the Indonesian Air Force, AirNav Indonesia, BMKG, Basarnas, the Ministry of Foreign Affairs, the Ministry of Finance, the national cyber-security authority, and independent safety expertise. A permanent secretariat should maintain a single risk register, evidence repository, and negotiation roadmap.

A National FIR Readiness and Reversibility Index should be used as an evidentiary tool rather than a political score. Its indicators should include surveillance coverage and availability, communication performance, controller staffing and ratings, sector-capacity analysis, safety-management maturity, successful simulator and parallel-operation results, cyber resilience, contingency recovery time, interoperability, civil–military coordination, data completeness, and fiscal sustainability. Each indicator should have a baseline, target, verification source, responsible institution, and corrective-action plan. When a defined threshold is reached, the result should trigger bilateral technical consultation and preparation of the relevant ICAO proposal.

Table 3. Phased Implementation of the Sovereign–Collaborative Adaptive FIR Model

Phase	Priority actions	Required evidence
1. Governance and data foundation	Create the National FIR Management Council; establish real-time data mirroring; define audit, incident, revenue, and cyber-security protocols.	Presidential/ministerial mandates, data-access tests, audit baseline, common risk register.
2. Capability validation	Upgrade systems and staffing; run simulator scenarios, shadow operations, and limited parallel operations; verify civil–military and contingency procedures.	Safety case, controller ratings, capacity study, interoperability and recovery tests.
3. Functional or vertical transfer	Select lower-risk functions or layers for staged transfer; retain joint monitoring and fallback arrangements.	Performance at or above agreed thresholds, independent validation, bilateral technical acceptance.
4. Treaty and ICAO adjustment	Negotiate an amendment or new agreement and submit changes through applicable ICAO regional procedures.	Joint implementation plan, affected-State consultation, aeronautical publication package.
5. Consolidated national service	Operate the transferred functions nationally while preserving regional coordination and contingency cooperation.	Stable safety performance, audit closure, continuous capacity and cyber-resilience monitoring.

Source: Proposed by the author based on the principles of safety continuity, accountability, interoperability, gradualism, and reversibility-by-design.

Policy Implications and Study Limitations

The practical implication is that Indonesia should not wait until the final years of the Agreement to prepare a new configuration. Capacity development, data governance, safety validation, and diplomacy must proceed as one program. Investment in communications, navigation, surveillance, air traffic management, simulation, and cyber resilience should be linked directly to transfer milestones. Navigation-charge revenue and national budget allocations should support this roadmap rather than merely maintain the existing arrangement. Regular reports to the legislature and national audit institutions can strengthen continuity across changes of government.

Safety and sovereignty should not be framed as competing objectives. Safety provides the non-negotiable performance threshold for any transition, while sovereignty supplies the legal authority and public-interest direction. Objective indicators prevent either concept from being used rhetorically: an unsafe takeover should not proceed, but an indefinitely unchanged delegation should not be justified

by abstract safety claims after equivalent national capability has been independently demonstrated.

This study has two main limitations. First, it relies on public legal and institutional materials and therefore cannot assess classified defense information, complete operational datasets, or confidential bilateral procedures. Second, it does not include interviews with controllers, regulators, military authorities, airlines, or neighboring States. The proposed readiness indicators and institutional design should therefore be tested through a future multidisciplinary study using operational data, safety modeling, stakeholder interviews, and comparative cross-border ANS arrangements. These limitations do not undermine the legal findings, but they restrict the precision of implementation thresholds.

CONCLUSIONS

The Indonesia–Singapore FIR arrangement is a delegation of air navigation functions, not a transfer of territorial sovereignty. Indonesia remains sovereign and retains regulatory and defense jurisdiction over the airspace concerned. However, formal sovereignty does not automatically amount to effective control because Singapore continues to provide an integrated package of operational services in Sectors A and B from the surface to 37,000 feet.

The 2022 Agreement represents substantial progress over the 1995 arrangement: it became operational, expanded the Jakarta FIR, clarified Indonesia as the delegating State, set a vertical limit, and formalized coordination and charges. Its principal weaknesses are the long duration, a review mechanism that does not itself redesign the delegation, broad functional integration, data asymmetry, and the absence of a readiness-based transfer mechanism. Law Number 21 of 2025 strengthens integrated domestic airspace governance but cannot alter the bilateral arrangement unilaterally.

The appropriate strategy is neither abrupt unilateral takeover nor passive maintenance of the status quo. Indonesia should implement a Sovereign–Collaborative Adaptive FIR model based on real-time data access, independent audit, civil–military coordination, a National FIR Management Council, a readiness and reversibility index, shadow and parallel operations, and staged transfer. Once verified thresholds are reached, Indonesia should pursue bilateral amendment and the applicable ICAO process. In this model, regional collaboration becomes a controlled means of transition, and safety becomes the measurable foundation for converting formal sovereignty into effective and sustainable national control.

CONFLICT OF INTEREST

The author declares no conflict of interest related to this article.

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DECLARATION OF ARTIFICIAL INTELLIGENCE USE

Generative artificial intelligence tools were used to assist with language editing, structural reorganization, and document formatting. The author reviewed and verified the legal analysis,

sources, interpretations, and conclusions and accepts full responsibility for the final manuscript. No AI-generated statement was retained without human review.

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