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From Intelligence Superiority to Decision-Making Superiority: Lessons from the Strait of Hormuz for the Strategic Security of the Strait of Malacca

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Abstract

Although maritime chokepoints have received substantial attention in research on maritime security, energy security, and military power, limited scholarship has examined how multi-domain intelligence is converted into decision superiority and applied across distinct chokepoint environments. This study investigated the intelligence-to-decision mechanisms demonstrated in the Strait of Hormuz and assessed their conditional relevance to the strategic security of the Strait of Malacca. It employed a qualitative, theory-guided case study design integrating process tracing, structured, focused comparison, and source triangulation. The analysis covered the period from 2019 to August 2026, treating the Strait of Hormuz as the primary critical case and the Strait of Malacca as the application case. Data were drawn from peer-reviewed literature, official documents, international organizations, reputable news agencies, strategic and defense research institutions, and open-source intelligence. The findings reveal that maritime strategic effects emerge through an interconnected sequence comprising multi-domain intelligence, surveillance, and reconnaissance (ISR), intelligence fusion, decision superiority, operational conversion, and strategic effects. Intelligence superiority alone does not guarantee strategic success; its effectiveness depends on converting integrated intelligence into timely, accurate,

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coordinated, and contextually appropriate decisions. The study contributes to maritime security scholarship by conceptualizing decision superiority as the mechanism linking intelligence architecture to strategic effects and demonstrating that lessons from the Strait of Hormuz should be transferred as adaptable mechanisms rather than replicated as military doctrines. For Indonesia, securing the Strait of Malacca requires prioritizing persistent ISR, multi-sensor intelligence fusion, interorganizational interoperability, rapid decision-making, and resilient surveillance instead of unilateral sea-denial strategies. These findings advance an intelligence-centric approach to maritime security and provide practical guidance for strengthening Indonesia's maritime intelligence architecture while preserving freedom of navigation and regional cooperation. Further research should test the proposed intelligence-to-decision mechanism using additional primary sources and comparative evidence from other strategic maritime chokepoints.

Keywords: Decision Superiority; Intelligence Superiority; Maritime Security; Strait of Hormuz; Strait of Malacca

INTRODUCTION

Maritime chokepoints have historically occupied a central position in international security because they concentrate economic, military, and political interests within geographically constrained sea routes (Bueger, 2015). Their strategic importance has become even more pronounced as contemporary maritime security increasingly depends on the ability to observe, interpret, and respond to activities across multiple operational domains. Advances in commercial and military satellites, remote sensing, Automatic Identification Systems (AIS), unmanned systems, signal and electronic intelligence, cyber capabilities, and artificial intelligence-assisted data processing have expanded the volume, speed, and diversity of information available to maritime security actors (Bueger & Edmunds, 2017; Saidi et al., 2026). Consequently, maritime advantage can no longer be assessed solely through the number of ships, aircraft, missiles, or other military platforms possessed by an actor. Increasingly, strategic advantage depends on the ability to detect relevant activities, integrate information from different sources, reduce uncertainty, identify emerging threats, and convert intelligence into timely and effective decisions (Gómez-Romero et al., 2015). The growing importance of maritime domain awareness (MDA) and information-sharing technologies illustrates this transformation, although technological capacity alone does not necessarily guarantee effective maritime security outcomes (Schultheiss, 2026).

The Strait of Hormuz provides an important empirical setting for examining this transformation. Connecting the Persian Gulf with the Gulf of Oman and the Arabian Sea, the strait remains one of the world's most consequential maritime chokepoints (Skat-Rørdam et al., 2025). In 2024, approximately 20.7 million barrels per day of crude oil, condensate, and petroleum products transited the Strait of Hormuz, equivalent to roughly one-fifth of global petroleum liquids consumption. In the first half of 2025, flows remained substantial at approximately 20.9 million barrels per day, representing about one-quarter of global maritime oil trade (Stach et al., 2023). The strategic significance of Hormuz therefore extends beyond its geographic location to its capacity to affect energy markets, international commerce, and the strategic calculations of states dependent on the route (POONNAWATT, 2023). The escalation of regional conflict has further demonstrated that the security of a chokepoint can be affected by the interaction between intelligence, surveillance and reconnaissance (ISR), precision operations, maritime threats, and asymmetric responses (Lanteigne, 2008; Paszak, 2021). The subsequent disruption of traffic through Hormuz in 2026 illustrates how rapidly a maritime chokepoint can become a strategic vulnerability when intelligence, military operations, and political decision-making interact under conditions of uncertainty. EIA data indicate that oil flows through the strait fell sharply to approximately 14.9 million barrels per day in the first quarter of 2026 and 4.9 million barrels per day in the second quarter, demonstrating the substantial consequences that disruption can impose on global energy flows (EIA, 2026).

The relevance of this experience extends to the Strait of Malacca, although the two chokepoints operate under substantially different strategic, legal, and institutional conditions. The Strait of Malacca is the principal maritime connection between the Indian and Pacific Oceans and constitutes a critical route for energy and commercial shipping to East and Southeast Asia (Agastia & Perwita, 2017; Octavian et al., 2020). In the first half of 2025, approximately 23.2 million barrels per day of oil transited the strait, making it the world's largest maritime oil chokepoint by transit volume during that period (EIA, 2026). Its security, however, cannot be approached through the logic of unilateral military control. The Straits of Malacca and Singapore are managed within a cooperative framework involving Indonesia, Malaysia, Singapore, user states, and other stakeholders. The International Maritime Organization (IMO) recognizes the Cooperative Mechanism as an institutional framework for information sharing, coordination, navigational safety, and environmental protection among the littoral states and relevant stakeholders, consistent with the international legal

framework governing straits used for international navigation (IMO, 2026). For Indonesia, the strategic challenge is therefore not simply to increase military presence in the strait, but to strengthen the capacity to detect, interpret, and respond to emerging threats while maintaining navigational freedom, sovereignty, regional cooperation, and proportionality (Saragih et al., 2016; Sitorus & Said, 2023).

This distinction leads to the central argument of this study. Conventional approaches to maritime security frequently emphasize material capabilities, including frigates, submarines, fighter aircraft, maritime patrol aircraft, coastal missile systems, and unmanned platforms (Ramadhianto et al., 2023). Such capabilities remain essential, but their strategic value is conditioned by the quality of information available to decision-makers. A sophisticated weapon system may have limited strategic utility if relevant threats cannot be detected, identified, tracked, or assessed in time. Conversely, a distributed network of relatively inexpensive sensors may produce significant strategic value when information from different sources is integrated and transformed into actionable intelligence (Hidayat & Ridwan, 2017). The critical issue is therefore not simply whether an actor possesses superior military platforms, but whether it possesses an architecture capable of transforming dispersed observations into intelligence and intelligence into superior decisions (Anwar, 2021).

Accordingly, this study conceptualizes maritime strategic advantage as a sequential intelligence-to-decision process: multi-domain ISR → intelligence fusion → intelligence superiority → decision superiority → coordinated operational response → strategic vulnerability reduction. Intelligence superiority is understood here as a relative not absolute capacity to acquire, integrate, interpret, and exploit critical information more effectively than an adversary under conditions of uncertainty. It does not imply complete knowledge of an operational environment. Rather, intelligence superiority exists when an actor is better positioned to reduce uncertainty, identify threats, anticipate developments, and provide decision-makers with sufficiently timely and reliable information. Decision superiority represents the subsequent stage in which this informational advantage is converted into faster, more accurate, and more coordinated strategic or operational decisions. The distinction is important because information superiority does not automatically produce strategic outcomes unless institutions possess the authority, interoperability, analytical capacity, and command mechanisms necessary to translate information into action.

Previous research provides important but fragmented insights into these relationships. Studies of the Strait of Hormuz have predominantly examined energy security, geopolitical competition, maritime disruption, and the strategic behavior of regional actors. Research on drones and emerging military technologies has examined how technological change affects offensive and defensive capabilities, including the increasing importance of sensor diversity, data collection, and real-time processing in contemporary conflict (Calcara et al., 2022). Intelligence and ISR scholarship, meanwhile, has traditionally emphasized information collection, surveillance, warning, intelligence analysis, and operational support. A separate body of research on the Strait of Malacca has concentrated on piracy, maritime governance, navigational safety, regional cooperation, and information-sharing arrangements. Although these strands of scholarship collectively demonstrate the growing importance of information and technology in maritime security, they have generally treated technological capability, intelligence processes, institutional coordination, and strategic decision-making as related but analytically separate issues.

Recent research on maritime domain awareness further demonstrates why technological superiority alone is insufficient. Schultheiss (2026), for example, examines the use of satellite technology, artificial intelligence, and information-sharing platforms such as Skylight, SeaVision, and IORIS in maritime security. The study shows that these platforms substantially enhance maritime observation and information availability, but their effectiveness depends on their integration with existing maritime security agencies, regional organizations, and legal frameworks. In other words, the central challenge is not simply the ability to generate information, but the ability to connect information with capable actors and appropriate institutional and legal mechanisms. This insight is particularly relevant to the Strait of Malacca, where maritime security responsibilities are distributed among multiple littoral states and agencies rather than concentrated within a single military authority (Schultheiss, 2026; IMO, 2026).

Nevertheless, an important analytical gap remains. Existing studies provide substantial explanations of how maritime information is collected, how situational awareness can be improved, and how states cooperate to manage maritime threats, but they provide less systematic explanation of the causal mechanism through which integrated intelligence is transformed into decision superiority and coordinated operational response. In particular, limited attention has been given to how lessons from an intensely contested chokepoint such as the Strait of Hormuz can be analytically transferred to a cooperative and legally

constrained chokepoint such as the Strait of Malacca. The gap is therefore not the absence of studies on intelligence, maritime awareness, or the two straits individually. Rather, it lies in the insufficient integration of these strands into a mechanism-based framework explaining how intelligence architecture can generate decision-making advantage and, ultimately, improve strategic security.

To address this gap, this study draws upon four interconnected concepts: sea control and sea denial, intelligence superiority, decision superiority, and sensor-to-decision architecture. The distinction between sea control and sea denial provides the strategic foundation for understanding how actors seek to influence the use of maritime space. While sea control concerns the ability to use a maritime area while limiting an opponent's ability to do so, sea denial does not require complete control of the maritime domain; rather, it seeks to prevent, disrupt, or increase the operational costs of an opponent's use of that domain. This distinction is particularly relevant to maritime chokepoints, where geographic constraints can allow actors with comparatively limited military capabilities to create significant vulnerabilities through intelligence, distributed sensors, missiles, mines, unmanned systems, and other asymmetric capabilities. Thus, the effectiveness of maritime control or denial depends not only on the availability of military platforms but also on the ability to detect, identify, classify, and track relevant targets.

Building on this foundation, the study conceptualizes intelligence superiority as a relative advantage in acquiring, integrating, interpreting, and operationalizing critical information more effectively and rapidly than an opponent. Intelligence superiority does not imply complete knowledge of the operational environment, but rather a greater capacity to reduce uncertainty and provide decision-makers with relevant and timely intelligence. It consists of four interconnected dimensions: collection superiority, fusion superiority, analytical superiority, and dissemination and operationalization superiority. These dimensions establish the connection between multi-domain ISR and the production of actionable intelligence. Consequently, persistent surveillance alone does not necessarily produce persistent situational awareness. Rather, persistent ISR must be supported by data fusion, analysis, and command integration to generate sustained situational awareness.

The strategic value of intelligence is subsequently realized through decision superiority, defined in this study as the ability to produce sufficiently accurate, timely, and strategically appropriate decisions that enable an actor to respond more effectively than an

opponent under conditions of uncertainty. Intelligence superiority therefore does not automatically translate into decision superiority. The transformation depends on the quality of information and analysis, inter-organizational integration, clarity of command authority, communication reliability, and the availability of response capabilities. The critical advantage consequently lies in reducing the time and friction between the detection of a potential threat and the implementation of an appropriate response.

To explain this transformation, the study employs a sensor-to-decision architecture rather than the narrower sensor-to-shooter concept. The latter primarily emphasizes the transition from target detection to the employment of military force, whereas maritime security involves a broader range of possible responses, including further identification, continuous monitoring, warning, interception, law enforcement, diplomatic coordination, or deliberate non-action when no actionable threat is identified. The sensor-to-decision architecture therefore follows the sequence Detection → Identification → Classification → Fusion → Assessment → Decision → Response → Reassessment. This framework allows intelligence to be connected to responses that are proportionate to the nature and level of threat, the authority of the responsible institution, and the legal and strategic context in which the decision is made.

This theoretical framework is particularly relevant to the comparison between the Strait of Hormuz and the Strait of Malacca. In Hormuz, intelligence superiority can support sea denial, deterrence, and the creation of uncertainty and operational costs for maritime users. In the Strait of Malacca, however, the same intelligence capabilities operate within an internationally regulated sea lane in which security responsibilities are distributed among multiple states and agencies. Intelligence superiority must therefore be translated into detection, warning, coordination, interception, or other proportionate responses rather than unilateral closure or control of the sea lane. The analytical significance of this distinction is captured by the concept of deterrence by detection, in which the capacity to reliably detect and identify potential violations can strengthen deterrence without requiring physical denial of access to the maritime route.

Accordingly, the analytical framework of this study can be expressed as follows: Sea Control/Sea Denial → Multi-Domain ISR → Intelligence Fusion → Intelligence Superiority → Decision Superiority → Sensor-to-Decision Response → Strategic Vulnerability Security. The framework does not assume that superior intelligence automatically produces superior

outcomes. Instead, it proposes that the strategic value of intelligence depends on its successful transformation into timely, accurate, coordinated, and legally appropriate decisions. This provides the basis for examining which intelligence-to-decision mechanisms demonstrated in the Strait of Hormuz may be relevant to Indonesia's security interests in the Strait of Malacca, while recognizing that their application must remain conditional on differences in geography, legal regimes, institutional arrangements, and strategic objectives.

METHODS

Research Design

This study employs a qualitative, theory-guided case study design to examine the mechanisms through which multi-domain intelligence and Intelligence, Surveillance, and Reconnaissance (ISR) capabilities are transformed into intelligence superiority, decision superiority, and strategic effects at maritime chokepoints (Rahmadhani et al., 2025). The study does not treat the Strait of Hormuz and the Strait of Malacca as equivalent cases for direct comparison. Instead, the Strait of Hormuz is examined first to identify and trace the intelligence-to-decision mechanisms operating under conditions of strategic and military confrontation. These mechanisms are subsequently assessed for their relevance to the Strait of Malacca while accounting for differences in strategic, institutional, legal, and geopolitical conditions (Christawan et al., 2023).

This methodological position is important because the two straits operate within substantially different security environments. The Strait of Hormuz has been examined in the context of military confrontation, coercion, and contested access, whereas the Strait of Malacca operates within a comparatively cooperative security environment involving Indonesia, Malaysia, Singapore, and other stakeholders. Accordingly, the study does not seek to compare the military outcomes of the two straits directly. Instead, it investigates whether and under what conditions the mechanisms identified in Hormuz can provide analytical and strategic lessons for the security of the Strait of Malacca.

The analysis focuses on the mechanism connecting multi-domain information collection, intelligence fusion and processing, intelligence superiority, decision-making, operational response, and strategic effects. Three complementary analytical approaches are employed. First, theory-guided process tracing is used to reconstruct the sequence through which intelligence capabilities are translated into decisions and strategic effects in the Strait

of Hormuz. Second, structured-focused comparison is used by applying a consistent set of analytical questions to the selected episodes. Third, source triangulation is employed by comparing evidence from academic literature, official sources, international organizations, reputable news agencies, strategic and defense research institutions, and open-source intelligence. These approaches are intended to generate analytical generalizations rather than statistical generalizations.

The Strait of Hormuz is selected as the primary critical case because it provides a particularly rich setting for observing the interaction between ISR, air power, maritime coercion, Anti-Access/Area Denial (A2/AD), unmanned systems, and great-power engagement. The Strait of Malacca is subsequently treated as a case application through which the identified mechanisms are assessed under a different legal, institutional, and strategic environment. The analytical objective is therefore mechanism transfer rather than direct case equivalence.

To maintain consistency throughout the analysis, the study applies eight analytical questions concerning: (1) available intelligence and ISR capabilities; (2) the integration of intelligence sources; (3) the transformation of intelligence into operational decisions; (4) evidence of intelligence or decision superiority; (5) attempts to disrupt or degrade surveillance and intelligence systems; (6) the interaction between air superiority and maritime control or denial; (7) the strategic effects produced by intelligence-enabled actions; and (8) the mechanisms that may be conditionally applicable to the Strait of Malacca.

Case Selection and Temporal Scope

The study covers the period from 2019 to August 2026. This period was selected to capture the development and application of intelligence, ISR, and decision-making capabilities in and around the Strait of Hormuz. The year 2019 provides the initial observation point because the downing of a U.S. ISR aircraft by Iran demonstrated the relevance of intelligence-gathering capabilities within the broader A2/AD competition. The analysis then concentrates on two major escalation episodes in 2025 and 2026, which provide different empirical settings for tracing the intelligence-to-decision mechanism.

The first episode covers June 13–24, 2025, encompassing Operation Rising Lion and Operation Midnight Hammer. This episode is examined primarily to trace the relationship between intelligence capabilities, target identification, defense-system penetration, precision

operations, and air superiority. It provides an empirical setting for examining how intelligence information can support operational planning and the execution of precision strikes. However, its relevance to the security of the Strait of Hormuz as a maritime chokepoint is comparatively limited because its direct effects on the continuity of navigation were less pronounced.

The second episode covers the period beginning February 28, 2026, and extending through August 2026. This episode is examined because it provides a more direct setting for analyzing the relationship between intelligence, ISR, decision-making, access restriction, maritime disruption, and chokepoint security. The episode provides an opportunity to examine how intelligence capabilities interact with strategic decisions concerning maritime access and how those decisions generate operational and strategic effects.

The two episodes are therefore selected for their mechanism-generating value, rather than because they possess identical characteristics. The 2025 episode provides evidence for tracing the relationship between intelligence, precision operations, and air superiority, whereas the 2026 episode provides a context for examining intelligence, access restriction, decision-making, and maritime chokepoint security. Examining both episodes allows the study to distinguish mechanisms that may have broader analytical relevance from effects that are dependent on specific strategic conditions.

The case selection is consequently not intended to determine whether Iran, Israel, or the United States achieved superior military outcomes. Instead, the analysis traces how information is collected, integrated, interpreted, disseminated, and translated into decisions and responses under different strategic conditions. The mechanisms identified from the Hormuz case are then assessed for their conditional relevance to the security environment of the Strait of Malacca.

Theory-Guided Process Tracing and Causal-Process Inference

The study employs theory-guided process tracing to examine the causal mechanisms linking intelligence architecture to operational and strategic outcomes. Process tracing is appropriate because the central research objective is not to measure the statistical effect of intelligence capabilities, but to reconstruct the sequence through which information is transformed into intelligence, intelligence into decisions, and decisions into operational and strategic effects.

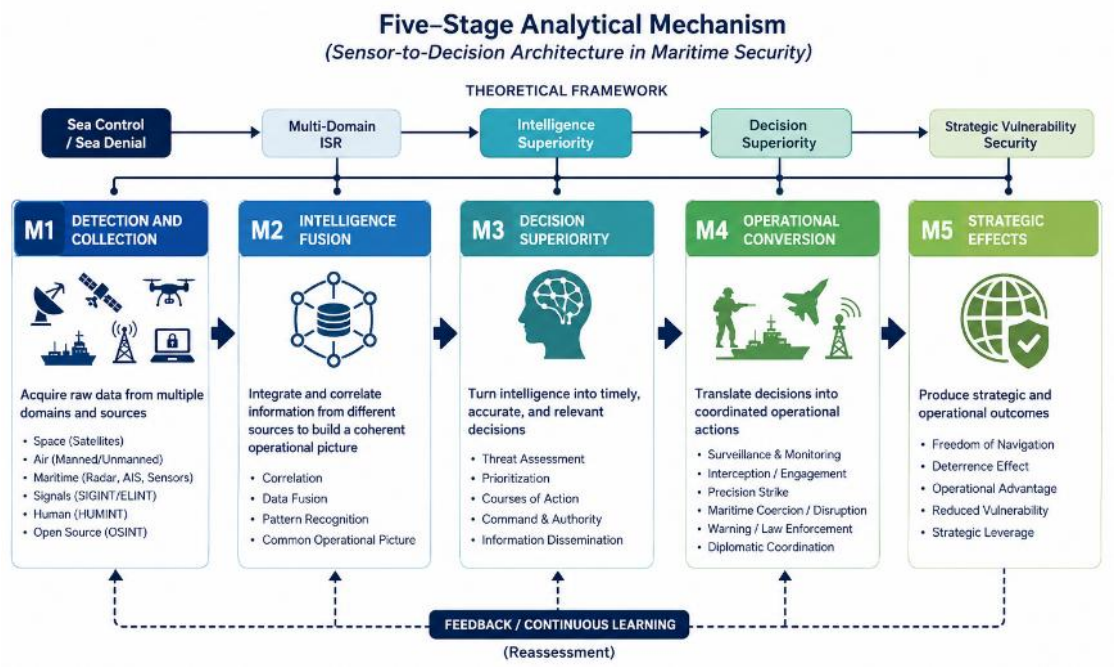


Figure 1. Five-Stage Analytical Mechanism

As illustrated in Figure 1, the analytical mechanism operationalizes the theoretical framework into a sequential process that explains how multi-domain intelligence can be transformed into strategic effects at maritime chokepoints. The framework connects the acquisition of information through multi-domain Intelligence, Surveillance, and Reconnaissance (ISR) with intelligence fusion, decision-making, operational action, and the resulting strategic effects. Rather than assuming that the possession of advanced surveillance or military platforms automatically produces strategic advantage, the mechanism emphasizes the processes through which information is collected, integrated, interpreted, transformed into decisions, and subsequently translated into operational responses. The five interconnected stages are therefore defined as follows:

1) M1 – Detection and Collection.

This stage concerns the acquisition of relevant information from multiple sources, including satellite imagery, airborne ISR, radar, unmanned aerial systems, maritime sensors, Signals Intelligence/Electronic Intelligence (SIGINT/ELINT), AIS, Human Intelligence (HUMINT), and Open-Source Intelligence (OSINT). The analysis examines the availability, continuity, diversity, and complementarity of these sources.

2) M2 – Intelligence Fusion.

This stage concerns the integration of information from multiple domains and sources into a coherent operational picture. The analysis examines whether fragmented observations can be combined to establish the identity, location, capabilities, activities, and possible intentions of relevant actors.

3) M3 – Decision Superiority.

This stage concerns the transformation of processed intelligence into timely and sufficiently accurate decisions. Consistent with the theoretical framework, decision superiority is not equated with decision speed alone. The analysis considers whether intelligence reached relevant decision-makers in time, whether it was sufficiently reliable and interpretable, and whether institutional and command arrangements allowed the information to influence decision-making.

4) M4 – Operational Conversion.

This stage examines how decisions were translated into observable actions, including surveillance, monitoring, interception, warning, precision strikes, maritime coercion, access restriction, or other responses appropriate to the identified threat and operational context.

5) M5 – Strategic Effects.

The final stage examines the consequences of intelligence-enabled decisions and actions for maritime access, freedom of movement, shipping behavior, operational costs, deterrence, coercive leverage, and the broader strategic vulnerability of the chokepoint.

These five mechanisms operationalize the sensor-to-decision architecture established in the theoretical framework: Detection → Identification → Classification → Fusion → Assessment → Decision → Response → Reassessment. The five-stage analytical structure therefore does not constitute a separate theoretical model; rather, it consolidates the detailed sensor-to-decision sequence into analytically observable mechanisms.

To assess the evidentiary strength of the proposed mechanisms, the study applies four process-tracing tests: straw-in-the-wind, hoop, smoking-gun, and doubly decisive tests. A straw-in-the-wind test identifies evidence that provides preliminary support for a mechanism but is insufficient to establish it. A hoop test examines evidence that should be present if a proposed mechanism is to remain plausible. A smoking-gun test identifies evidence that provides strong support for a particular mechanism, although its absence does

not necessarily disprove the mechanism. A doubly decisive test represents evidence that simultaneously supports the proposed mechanism and weakens plausible alternatives. Because intelligence activities are frequently classified and publicly available evidence is incomplete, the study recognizes that doubly decisive evidence may be rare.

Importantly, the study does not treat the numerical superiority or technical sophistication of military platforms as direct evidence of intelligence superiority. A claim of intelligence superiority must instead be supported by evidence demonstrating that the intelligence process from collection and fusion through assessment and dissemination contributed to the timeliness, accuracy, coordination, or effectiveness of subsequent decisions and actions.

Primary Explanation and Alternative Explanations

The principal explanation examined in this study is intelligence architecture, defined as the capacity to collect, integrate, analyze, disseminate, and operationalize multi-domain information within a decision-making system (Aprila et al., 2023; Aprila & Dwiharyadi, 2026). The study evaluates whether this architecture provides a more adequate explanation of observed operational and strategic effects than alternative explanations. Three principal alternative explanations are considered.

1) A1 – Platform Superiority.

This explanation attributes operational success primarily to superiority in military technology and weapons platforms, including stealth aircraft, precision-guided munitions, unmanned systems, naval assets, and other advanced capabilities.

2) A2 – Geographical Advantage.

This explanation emphasizes the structural effects of geography, including the narrowness of the Strait of Hormuz, coastal configuration, maritime traffic patterns, and other physical characteristics that may facilitate or constrain military and maritime operations.

3) A3 – Alliance and External Support.

This explanation considers whether external assistance, intelligence support, military cooperation, or strategic relationships contributed substantially to observed outcomes, including U.S. support for Israel and Iran's relationships with external partners.

These explanations are not treated as mutually exclusive. Military platforms, geography, and external support may all contribute to operational outcomes. The analytical task is therefore not to deny their importance, but to determine whether they adequately explain the observed sequence of events without the intelligence architecture mechanism. For example, platform superiority may explain the availability of precision-strike capability but may not by itself explain how targets were identified, prioritized, tracked, and engaged at the required time. Similarly, geography may shape the operational environment but cannot necessarily explain changes in operational outcomes across different episodes. External support may provide additional capabilities, but its strategic value may depend on whether information can be effectively integrated into the relevant decision-making architecture.

The intelligence architecture explanation is therefore evaluated according to its ability to account for the observed transition from information collection and fusion to decision-making, operational action, and strategic effects while considering the explanatory contribution of A1–A3. This comparative assessment strengthens the causal-process inference while recognizing the limits imposed by the availability of public evidence.

Data Sources and Limitations

The study employs multiple categories of sources to reduce dependence on any single information provider and to facilitate triangulation. Peer-reviewed academic literature is used primarily to establish theoretical concepts, previous findings, and methodological foundations. Official sources and international organizations, including the International Atomic Energy Agency (IAEA), International Energy Agency (IEA), and International Maritime Organization (IMO), are used to obtain official information, regulatory frameworks, and institutional perspectives. These sources are treated as authoritative for their respective areas but are not automatically assumed to be neutral. Reuters and the Associated Press are primarily used to reconstruct event chronology and corroborate publicly reported developments. Strategic and defense research institutions, including the International Institute for Strategic Studies (IISS) and Center for Strategic and International Studies (CSIS), are used for technical and strategic analysis. Open-source intelligence is used primarily to supplement and cross-check information obtained from other sources.

To ensure analytical consistency, evidence is categorized into seven dimensions: ISR; intelligence fusion; decision superiority; air superiority; sea denial; electromagnetic and cyber

contestation; and strategic coercion. These categories allow evidence from different types of sources to be assessed against the same theoretical framework and linked to the five causal mechanisms identified in the process-tracing design.

The study has three principal limitations. First, the classified nature of intelligence operations means that publicly available sources cannot fully reconstruct the information, assessments, and decisions available to state actors at the time of an event. Second, information generated during armed conflict is subject to strategic communication, selective disclosure, misinformation, and competing narratives, requiring careful source triangulation. Third, the Strait of Hormuz and the Strait of Malacca differ substantially in their legal, political, institutional, and security environments. Consequently, the findings should not be interpreted as evidence that the military doctrine or strategic approach used in Hormuz can be directly replicated in Malacca.

Instead, the study adopts a conditional knowledge-transfer approach. It identifies mechanisms that may have relevance across different maritime environments particularly persistent ISR, intelligence fusion, decision superiority, redundancy, and inter-organizational interoperability while recognizing that their implementation must be adapted to the legal authority, institutional structure, strategic objectives, and cooperative arrangements governing the Strait of Malacca.

RESULTS

The results are presented according to the five-stage analytical mechanism established in Figure 1: M1 Detection and Collection, M2 Intelligence Fusion, M3 Decision Superiority, M4 Operational Conversion, and M5 Strategic Effects. The analysis focuses on the selected episodes in the Strait of Hormuz and identifies observable evidence of how information was collected, integrated, transformed into decisions, converted into operational actions, and associated with strategic effects. The results are presented descriptively and separately from the theoretical interpretation and comparison with previous literature, which are addressed in the Discussion section.

Selected Episodes and Empirical Scope

The analysis covers three empirically relevant periods between 2019 and August 2026. The 2019 episode serves as an initial observation of intelligence and ISR capabilities

within the broader A2/AD environment. The two principal episodes are the June 2025 military campaign and the escalation beginning in February 2026. These episodes provide different empirical observations of the intelligence-to-decision mechanism.

Table 1. Selected Episodes and Empirical Focus in the Strait of Hormuz

Period	Episode	Primary empirical focus	Observed evidence
2019	Downing of a U.S. ISR aircraft by Iran	Intelligence and ISR within A2/AD competition	Demonstrated the vulnerability and strategic relevance of ISR assets in the contested environment
June 13–24, 2025	Operation Rising Lion and Operation Midnight Hammer	Intelligence preparation, target identification, air operations, and precision strikes	Targeting of nuclear, military, leadership, air-defense, and ballistic-missile facilities; subsequent U.S. strikes on three uranium enrichment facilities
February–August 2026	Operations Epic Fury and Roaring Lion and subsequent maritime disruption	Intelligence, leadership targeting, sea denial, maritime access, and strategic effects	Reported leadership targeting, access restrictions, mine deployment, changes in tanker traffic, vessel anchoring, and subsequent changes in maritime access

Source: Compiled from the evidence reviewed in this study.

Table 1 shows that the selected episodes provide different types of evidence for the analytical mechanism. The 2019 observation establishes the relevance of ISR within the contested operational environment. The June 2025 episode provides evidence concerning the relationship between intelligence preparation and precision air operations, while the 2026 episode provides more direct evidence concerning intelligence-enabled maritime disruption and sea denial. The episodes are therefore used to trace different stages and manifestations of the intelligence-to-decision mechanism rather than to compare military outcomes across identical cases.

Evidence of the Five-Stage Intelligence-to-Decision Mechanism

The empirical evidence was subsequently organized according to the five mechanisms specified in the research design. Table 2 summarizes the principal observable evidence identified across the selected Hormuz episodes.

Table 2. Evidence Across the Five Analytical Mechanisms

Mechanism	Empirical evidence identified	Observable output
M1 – Detection and Collection	Satellite and airborne ISR, radar, UAVs, maritime sensors, SIGINT/ELINT, AIS, HUMINT, OSINT, target databases, air-defense mapping, and monitoring of activity patterns	Identification of relevant locations, assets, activities, and threat conditions

Mechanism	Empirical evidence identified	Observable output
M2 – Intelligence Fusion	Integration of information concerning target locations, air-defense systems, leadership structures, missile facilities, maritime activities, and vessel movements	Development of a more coherent operational picture for target assessment and maritime monitoring
M3 – Decision Superiority	Intelligence concerning strategic targets and temporary leadership locations was available before operational actions; decisions included target prioritization and timing of operations	Selection and prioritization of targets and determination of operational responses
M4 – Operational Conversion	Precision air strikes, surveillance, interception, maritime inspection, mine deployment, access restriction, and other maritime responses	Physical and operational actions directed at military or maritime targets
M5 – Strategic Effects	Changes in maritime access, tanker traffic, vessel behavior, transit costs, and bargaining conditions	Reduced maritime movement, increased uncertainty and operational costs, and changes in access conditions

Source: Compiled from the process-tracing evidence examined in this study.

The evidence in Table 2 indicates that all five stages of the analytical mechanism can be observed in the selected episodes, although the availability and strength of evidence differ across stages. The collection stage is supported by evidence concerning the use of multiple intelligence and surveillance sources. The fusion stage is reflected in the preparation and integration of information concerning targets, air defenses, leadership structures, and maritime activities. The decision stage is observed through the selection, prioritization, and timing of operational targets. These decisions were subsequently converted into air operations and maritime actions, producing observable changes in the operational environment.

The evidence is particularly visible in the June 2025 episode. Israeli operations beginning on June 13, 2025 targeted Iranian nuclear and military facilities, senior military officials and nuclear scientists, air-defense systems, and ballistic-missile facilities. The United States subsequently conducted strikes on three uranium enrichment facilities on June 22. The sequence of attacks included targets with different operational functions, including air-defense systems, leadership structures, and missile capabilities. The reported pattern provides evidence of target selection and prioritization before and during the operational campaign.

The evidence also indicates that intelligence preparation extended beyond information available immediately before an attack. The reviewed material identifies the compilation of target databases, mapping of air-defense systems, recognition of activity patterns, and identification of leadership structures as elements of the preparatory process.

These activities provide observable evidence for the collection and processing stages preceding operational action.

Intelligence, Targeting, and Operational Decision-Making in the 2025 Episode

The June 2025 episode provides the clearest evidence concerning the relationship between intelligence preparation and precision air operations. Israel's campaign involved attacks against nuclear facilities, military installations, senior officials, air-defense systems, and ballistic-missile facilities. The United States subsequently joined the campaign on June 22 by attacking three uranium enrichment facilities. The fighting ended with a ceasefire on June 24.

The distribution of targets provides evidence of differentiated operational objectives. Air-defense facilities were targeted to affect the conditions under which subsequent air operations could be conducted, while leadership and missile facilities represented different categories of strategic and operational targets. The sequence therefore provides evidence that target selection was not limited to a single category of military asset.

The available evidence also shows that operational freedom did not correspond to the complete achievement of every operational objective. Some nuclear facilities located deep underground reportedly sustained only partial damage despite the high level of air operational freedom achieved during the campaign. The evidence therefore records both the operational effects achieved and the remaining physical limitations of the campaign.

The 2025 episode also provides evidence concerning the temporal dimension of intelligence collection. Information used during the operations was associated with preparation conducted before the attacks, including target databases, air-defense mapping, activity-pattern recognition, and identification of leadership structures. The observed sequence extends from information preparation to target selection and subsequent operational action rather than being limited to information collected immediately before individual strikes.

Intelligence and Leadership Targeting in the 2026 Episode

The escalation beginning on February 28, 2026 provides additional evidence concerning the relationship between intelligence, decision-making, and operational targeting. During the first twelve hours of the episode, approximately 900 attacks were reported, including an attack that killed Iran's Supreme Leader Ali Khamenei and several senior

officials. The evidence reviewed in this study reports that U.S. and Israeli intelligence had identified a meeting involving Iranian leaders and that preparation for the operation had taken place over several months (Trenta & Jimenez Bacardi, 2026).

The identification of a temporary leadership meeting represents a distinct type of intelligence evidence because the target was not necessarily a fixed installation. The available evidence therefore indicates the use of information concerning the location and timing of leadership activity before the operational action. This observation provides evidence connecting intelligence collection and assessment with target selection and operational execution.

Subsequent developments also demonstrate that the elimination of individual leadership targets did not terminate the broader conflict. Mojtaba Khamenei was subsequently appointed as successor, while Iran continued its military and diplomatic resistance. The end of Operation Epic Fury on May 5, 2026 also did not immediately result in the reopening of the Strait of Hormuz. These observations indicate that operational targeting and broader strategic outcomes occurred at different levels and time horizons.

Maritime Disruption and Sea Denial in 2026

The 2026 episode provides the most direct evidence concerning the relationship between intelligence capabilities, maritime access, and sea denial. Following the February 28 attacks, Iran employed coastal sensors, missiles, mines, UAVs, and fast attack boats within the geographic constraints of the Strait of Hormuz. The observed activities included detection, classification, tracking, threat assessment, and measures directed at restricting maritime access. The reported maritime effects are summarized in Table 3.

Table 3. Reported Maritime Effects During the 2026 Strait of Hormuz Disruption

Indicator	Reported observation
Decline in tanker traffic	Approximately 70%
Ships anchoring outside the strait	More than 150 vessels
Sea-mining activity	Began from March 11, 2026
Mine-laying capability	Several mine-laying vessels reportedly destroyed by U.S. forces
Maritime access	Shipping was subject to restrictions and increased operational requirements

Source: Evidence compiled from the sources reviewed in this study.

The data indicate a substantial change in maritime behavior during the period of disruption. Approximately 70% of tanker traffic reportedly declined, while more than 150

ships chose to anchor outside the Strait of Hormuz. Vessels that continued to transit reportedly faced additional requirements and costs, including direct negotiations with the Islamic Revolutionary Guard Corps. These observations provide measurable evidence of changes in shipping behavior and maritime access during the period of sea denial.

The maritime disruption also involved counter-actions against Iran's denial capabilities. Israeli attacks reportedly reduced portions of Iran's missile stockpiles, while U.S. operations destroyed some mine-laying capabilities. The available evidence therefore records both the deployment of denial capabilities and attempts by opposing forces to degrade those capabilities.

The pattern of maritime access subsequently changed during the following months. After a U.S. blockade and a ceasefire mediated by Pakistan, Iran and the United States reached the Islamabad Memorandum of Understanding on June 17, 2026. Under the reported arrangement, Iran agreed to reopen the strait for 60 days and undertake mine clearance, accompanied by changes to the blockade and sanctions arrangements. The agreement was subsequently disrupted after Iran attacked commercial ships in early July, followed by a U.S. counterattack and reinstatement of the blockade on July 14. Some vessels nevertheless continued to transport Iranian oil, particularly toward China.

Persistent ISR and Information-System Resilience

The evidence from the United States provides a further observation concerning persistent maritime surveillance. The reviewed material identifies the use of UAVs, unmanned ships, warships, and distributed sensors around Hormuz to support persistent maritime situational awareness. These capabilities were associated with efforts to detect activities, identify anomalies, and provide information for rapid decision-making.

The evidence also identifies dependence on interconnected information systems, including radar, communications, AIS, navigation systems, and digital networks. The available observations indicate that surveillance capability depends not only on the existence of individual sensors but also on the continuity and connectivity of the information systems through which maritime information is transmitted and processed.

Cross-Case Findings and Explanation Tests

The evidence across the selected episodes was also examined against the three alternative explanations specified in the research design: platform superiority, geographical factors, and alliance or external support. Table 4 summarizes the principal observations.

Table 4. Evidence Relevant to the Primary and Alternative Explanations

Explanation	Evidence observed in the cases	Empirical status
Intelligence architecture	Multi-domain collection, target databases, air-defense mapping, information concerning leadership locations, persistent ISR, and intelligence-linked operational actions	Supported by multiple observations
Platform superiority	Use of advanced aircraft, precision weapons, UAVs, naval systems, missiles, and other military platforms	Contributing factor observed
Geographical factors	Narrow geography of the Strait of Hormuz and coastal conditions affecting maritime operations	Enabling condition observed
Alliance/external support	U.S.–Israeli operational cooperation and external strategic relationships involving Iran	Contextual contribution observed

Source: Compiled from the evidence examined in the study.

The evidence does not indicate that platform capabilities, geography, or external relationships were absent from the observed outcomes. Advanced military platforms were used during the 2025 and 2026 operations, while the geographical characteristics of the Strait of Hormuz shaped maritime operations. External relationships also formed part of the broader strategic environment. However, the process-tracing evidence identifies information collection, intelligence preparation, and the connection between intelligence and operational actions across multiple episodes.

The evidence further shows that the roles of Russia and China were primarily contextual rather than those of an integrated military alliance with Iran. The countries participated in joint naval exercises, including Security Belt 2025, but the available evidence does not establish an integrated wartime command structure. China maintained economic and strategic interests in Iran while also having an interest in the stability of energy flows through the Strait of Hormuz. Similarly, the Russia–Iran relationship is not equivalent to a collective-defense arrangement such as NATO.

Overall, the empirical results identify recurring evidence across the five stages of the analytical mechanism. Information was collected from multiple domains, relevant information was integrated for target and maritime assessment, intelligence was associated with operational decisions, decisions were translated into military or maritime actions, and those actions were followed by observable changes in the operational and maritime

environment. The interpretation of these findings and their relationship to the theoretical framework, previous studies, and their implications for the Strait of Malacca are addressed in the Discussion section.

DISCUSSION

Intelligence Superiority as the Enabling Mechanism of Maritime Power

The findings demonstrate that the effectiveness of maritime power in the Strait of Hormuz cannot be explained solely by the quantity or sophistication of military platforms. The 2025 and 2026 episodes show recurring evidence of intelligence collection, target identification, information integration, and intelligence-supported operational actions. This supports Proposition 1, which argues that the effectiveness of maritime control or restriction is strongly influenced by intelligence and ISR capabilities. The findings also support the argument that sea control and sea denial depend on the ability to detect, identify, classify, and track relevant targets before an actor can effectively influence maritime activity. This extends the conventional platform-centered understanding of maritime security by placing intelligence architecture as an enabling component of military and maritime power.

The findings are also consistent with Calcara et al. (2022), who emphasize that the effectiveness of emerging military technologies depends on operational context and the interaction between technology, sensors, weapons, and countermeasures. In the Hormuz case, advanced aircraft, missiles, and unmanned systems generated operational effects, but their effectiveness depended on information concerning targets and the surrounding operational environment. Intelligence superiority should therefore be understood as a relative capability that enables available military resources to be employed more effectively rather than as a substitute for those capabilities.

From Intelligence Superiority to Decision Superiority

The results further indicate that intelligence collection alone does not constitute intelligence superiority. The evidence of target databases, air-defense mapping, leadership identification, and persistent ISR demonstrates the importance of integrating information before it reaches the decision-making stage. This supports Proposition 2, which states that cross-domain ISR produces intelligence superiority only when information can be fused, interpreted, and disseminated within a timely decision-making cycle.

More importantly, the findings support Proposition 3 by showing that the strategic value of intelligence depends on its conversion into decisions and operational actions. The identification of leadership locations and strategic targets in the 2025 and 2026 episodes illustrates the importance of reducing the time between intelligence assessment and operational response. However, the continuation of Iranian resistance after major leadership and military targets were attacked also demonstrates that decision superiority is not equivalent to permanent strategic superiority. Decision advantage is therefore relative, temporal, and adaptive. It can generate operational success at a particular moment while remaining vulnerable to the opponent's subsequent adaptation.

This finding addresses an important gap in existing maritime security research. Much of the discussion of maritime domain awareness focuses on improving the availability and sharing of information. The present findings indicate that the more consequential analytical question is what happens after information becomes available: whether institutions can integrate it, assess it, authorize action, and respond within the relevant operational timeframe.

Sea Denial and Deterrence by Detection

The 2026 evidence provides a particularly important illustration of the distinction between sea control and sea denial. Iran did not need to achieve permanent control of the Strait of Hormuz to influence maritime behavior. By increasing uncertainty, risk, and transit costs, its capabilities affected the decisions of shipping actors and contributed to changes in maritime traffic. This supports the theoretical distinction developed in Section 2 between sea control and sea denial.

However, the Hormuz experience should not be transferred directly to the Strait of Malacca. The latter operates within an international navigation regime and a cooperative institutional environment involving Indonesia, Malaysia, and Singapore. Consequently, the relevant lesson is not the replication of A2/AD or physical access denial, but the use of deterrence by detection. As proposed in Proposition 4, credible capabilities to detect, identify, and monitor suspicious activities can strengthen deterrence without requiring unilateral restriction of legitimate maritime access.

This distinction is particularly important for Indonesia. Intelligence superiority in Malacca should support early detection, warning, coordinated interception, and lawful enforcement rather than unilateral maritime closure. The same intelligence mechanism can

therefore produce different strategic outcomes depending on the legal and institutional context in which it is employed.

Conditional Transfer from Hormuz to Malacca

The comparison indicates that the most transferable lesson from Hormuz is not a particular weapon system or military doctrine, but the intelligence-to-decision mechanism. Persistent ISR, multi-sensor fusion, anomaly detection, decision-making speed, redundancy, and interoperability are potentially relevant to Indonesia because the security challenge in Malacca involves dense maritime activity and multiple institutions. Schultheiss (2026) similarly emphasizes that the effectiveness of maritime domain awareness depends on information integration and institutional interoperability rather than sensing capacity alone.

At the same time, the transfer must remain conditional. The Israeli offensive model and Iranian sea-denial approach cannot simply be reproduced in Malacca because Indonesia operates within a different legal and cooperative environment. What can be transferred is the underlying mechanism: persistent observation → information fusion → assessment → timely decision → proportionate response. This supports the study's central argument that lessons from one chokepoint should be transferred as mechanisms rather than as complete strategic doctrines.

Implications for Indonesia's Maritime Intelligence Architecture

The findings suggest that Indonesia's priority should not be limited to increasing the number of sensors or military platforms. The more important challenge is connecting existing capabilities across institutions so that information can be transformed into a shared operational picture and timely decisions. This includes stronger integration of radar, UAV, AIS, electro-optical and other maritime information sources, together with clearer mechanisms for information sharing and response authority.

The implication is therefore an intelligence-centric rather than platform-centric approach to maritime security. Indonesia does not need to replicate the military posture of the United States, Israel, or Iran in Hormuz. Instead, it can adapt the underlying intelligence architecture to strengthen persistent surveillance, fusion, decision-making, redundancy, and inter-organizational interoperability while maintaining freedom of navigation and respect for the sovereignty of the littoral states.

CONCLUSION

This study demonstrates that strategic security at maritime chokepoints increasingly depends on the ability to transform information into timely and effective decisions rather than solely on the possession of superior military platforms. The analysis of the Strait of Hormuz identifies a recurring intelligence-to-decision mechanism consisting of multi-domain detection and collection, intelligence fusion, decision-making, operational conversion, and strategic effects. The findings support the study's propositions that intelligence and ISR contribute to the effectiveness of maritime control and denial, while intelligence superiority generates greater strategic value when it can be translated into timely and coordinated decisions.

The comparison further shows that the principal lesson from the Strait of Hormuz is not the replication of the military doctrines or capabilities of the United States, Israel, or Iran, but the transfer of underlying intelligence mechanisms. Persistent ISR, multi-sensor intelligence fusion, timely decision-making, redundancy, and interoperability are potentially relevant to Indonesia's security interests in the Strait of Malacca. However, their application must remain conditional because Malacca operates within a different legal, institutional, and geopolitical environment. In this context, intelligence superiority is more appropriately directed toward deterrence by detection, early warning, coordinated response, and lawful maritime security rather than unilateral sea denial.

The study therefore contributes an intelligence-centric perspective to maritime chokepoint security by positioning decision superiority as the mechanism connecting intelligence architecture with strategic effects. For Indonesia, strengthening maritime security should consequently focus not only on expanding surveillance and defense platforms but also on integrating existing information sources, improving inter-organizational interoperability, accelerating decision-making, and maintaining resilient surveillance capabilities. Nevertheless, the findings are constrained by the limited availability of classified intelligence and the inherent differences between Hormuz and Malacca. Future research can strengthen the analysis through additional primary sources, comparative empirical evidence, and mixed-method approaches to further test the intelligence-to-decision mechanism across maritime chokepoints.

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