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Research Article

Coast Guard's performance: Impacts of interorganizational relations and IT adoptions

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Abstract

This study examines how interorganizational relations and IT adoption influence strategic alliance performance and institutional effectiveness within the Indonesian Coast Guard (Bakamla), the central coordinating body in Indonesia's fragmented maritime security system. It emphasizes structural and relational mechanisms- namely coordination, cooperation, and technological infrastructure- as key drivers of organizational performance. Data collected from 136 personnel engaged in multi-agency maritime operations were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM). The results show that both interorganizational relations and IT adoption significantly improve strategic alliance performance which, in turn, fully mediates their effect on organizational performance. These findings highlight the importance of institutional trust and digital integration in enhancing cross-agency coordination and strengthening maritime governance in archipelagic contexts.

1. Introduction

Maritime security has become an increasingly complex and multidimensional issue, shaped by both traditional and non-traditional challenges such as piracy, terrorism, illegal fishing, human trafficking, and transnational organized crime. It is receiving heightened attention as certain threat indicators show a worrying escalation. For example, the International Maritime Bureau (IMB) reported 90 incidents of piracy and armed robbery globally in the first half of 2025- approximately a 50 % increase compared to the same period in 2024 (ICC & IMB, 2025a). While the annual total for 2024 (116 incidents) remained relatively steady compared to previous years (120 in 2023), the number of crew hostage-takings (126 in 2024 vs. 73 in 2023) and weapons-involved incidents continues to rise (ICC & IMB, 2025b). In parallel, non-traditional threats, such as cyber-attacks on maritime systems, are emerging as significant risks (Raymaker et al., 2025). Together, these data suggest not merely greater recognition of maritime threats, but an observable shift in intensity, gravity, and complexity- particularly in key chokepoints and archipelagic contexts.

At the same time, the maritime domain faces growing safety challenges related to natural disasters, navigation hazards, and marine pollution incidents. Many international and intergovernmental bodies now recognize that maritime governance encompasses both security and safety dimensions that require interagency coordination and technological integration (Li, 2023; Li, 2024). According to the European Coast Guard Functions Framework (European Cooperation on Cuast Guard Functions, 2009), coast guard functions broadly include two interrelated but distinct

domains: (1) Security-related functions, which involve law enforcement, border control, counterterrorism, and protection of maritime sovereignty; and (2) Safety-related functions, which encompass search and rescue (SAR), accident prevention, marine environmental protection, and navigational support. Understanding this distinction is critical, as confusion between security and safety mandates can lead to fragmented responsibilities and coordination failures- issues that are particularly visible in countries with multiple maritime enforcement agencies. In Indonesia, where jurisdiction spans over 17,000 islands, these coordination challenges are amplified.

The Indonesian Coast Guard, or Maritime Security Agency (Badan Keamanan Laut, Bakamla), serves as the central coordinating agency for maritime security and safety enforcement under Law No. 32 of 2014 on Maritime Affairs. Structurally, Bakamla operates through three regional zones- Western (Batam), Central (Manado), and Eastern (Ambon)- each led by a one-star officer and supported by regional bases and radar units. As a tri-service coordinating body, Bakamla is mandated to conduct maritime security and safety patrols, synchronize interagency operations, and safeguard national jurisdictional waters.

However, Bakamla's coordination mandate is complicated by overlapping jurisdictions among at least a dozen maritime law enforcement bodies, including the Navy (TNI AL), the Ministry of Transportation's Sea and Coast Guard Unit (KPLP), and the Ministry of Marine Affairs and Fisheries (KKP). Studies have shown that institutional fragmentation and unclear authority lines hinder operational effectiveness (Agastia et al., 2024; Laksmana, 2022). This fragmentation has produced dual claims to the "Coast Guard" identity between Bakamla and KPLP- a tension that continues to constrain unity of command and coordination. Hence, Bakamla's presence as an organization expected to coordinate maritime security institutions has often been poorly received (Arif, 2019).

In response to these challenges, Government Regulation No. 13 of 2022 introduced the concept of national joint patrols to strengthen legal coordination and operational efficiency. However, implementation remains uneven, due to budgetary limits, digital disparities, and inconsistent information sharing across agencies (Bakamla, 2022; Hardinata et al., 2023). The establishment of the Indonesian Maritime Information Center (IMIC) in Batam- designed to integrate real-time surveillance and Automatic Identification System (AIS) data- has improved situational awareness, but issues of interoperability and data governance persist (Nirmala & Long, 2020).

These institutional realities make Bakamla an ideal case for analyzing how interorganizational relations and IT adoption shape strategic alliance performance in a fragmented maritime governance environment. This study, therefore, investigates the mechanisms through which collaboration and technology jointly influence institutional effectiveness within Indonesia's multi-agency maritime governance system.

The remainder of this paper is organized as follows: the next section reviews relevant literature and formulates hypotheses; this is followed by the methodology, results, discussion, and concluding remarks, including theoretical and practical implications for maritime governance.

2. Literature review and related hypothesis

2.1 Inter-organizational relations (IOR) and strategic alliance performance

Inter-organizational relations (IOR) refer to patterns of interaction between autonomous institutions that collaborate to pursue shared goals and solve mutual problems (Reiners, 2020; Jensen & Thunberg, 2024). These interactions include cooperation, resource-sharing, knowledge exchange, and joint projects (Frogeri et al., 2022). Within the framework of strategic alliances, strong IOR contribute significantly to alliance performance. Empirical studies have identified key IOR factors- such as proactivity (Kusa, 2020), cooperation (Phuong et al., 2021), and coordination (Nguyen et al., 2021)- as central drivers of alliance success. Coordination enhances efficiency by maximizing collective benefits (Yu et al., 2019), while cooperation fosters mutual learning and innovative problem-solving (Abdalkrim & Guizani, 2022).

Tjemkes et al. (2023) describe alliances as long-term contractual partnerships among autonomous organizations designed to achieve both individual and shared objectives through joint resource mobilization. Effective IOR enhance alliance quality, which in turn strengthens alliance performance. In the Indonesian Coast Guard (ICG) context, effective maritime alliances- including joint training, coordinated patrols, and collaborative enforcement- have the potential to significantly reduce maritime crime. Based on this, the following hypothesis is proposed:

H1: Interorganizational relations positively influence strategic alliance performance.

2.2 Information technology (IT) adoption and alliance performance

Rather than viewing information technology merely as a tool, recent scholarship considers IT as a source of dynamic capability that enables organizations to adapt, integrate, and reconfigure internal and external competencies (Teece, 2023). From this perspective, IT-enabled dynamic capabilities include sensing environmental change, seizing collaborative opportunities, and transforming operational processes (Melville et al., 2004).

Within strategic alliances, IT adoption fosters interoperability, improves situational awareness, and supports integrated decision-making- particularly in environments characterized by uncertainty and distributed operations (Evangelista & Hallikas, 2022). For Bakamla, IT systems such as vessel monitoring and real-time communication platforms are essential for cohesive alliance operations.

H2: IT adoption positively influences strategic alliance performance.

2.3 IOR and Indonesian Coast Guard organizational performance

IOR are also instrumental in enhancing organizational performance. Cooperation enables partners to compensate for each other's weaknesses (Ahamed & Noboa, 2023), optimize resource use, and improve operational efficiency (Lee & Choi, 2021; Yu et al., 2019). The form of alliance-ecosystem, open innovation, triple helix, or multi-partner- determines how individual member performance is influenced (Tjemkes et al., 2023). In each case, the success of the alliance drives member performance.

From a strategic management perspective, effective IOR allow the ICG to access external support and resources, enhancing operational performance. For instance, having coordinated inspections by alliance members results in avoiding redundant enforcement, improving efficiency, and reducing burden on inspected vessels. Hence, the next hypothesis is:

H3: Interorganizational relations positively influence the Indonesian Coast Guard's organizational performance.

2.4 IT adoption and Indonesian Coast Guard organizational performance

Extensive research supports the link between IT adoption and improved organizational performance (Chiu & Yang, 2019; Lin & Qamruzzaman, 2023; Qureshi et al., 2023). IT enhances effectiveness and efficiency, making organizations more competitive. From the resource dependency perspective, limited performance stems from inadequate capacity to manage scarce resources (Shin et al., 2020). IT adoption strengthens this capacity and improves strategic responses.

Drawing on resource-based and capability-based views, IT adoption is a key enabler of operational excellence in public sector organizations. It facilitates accurate enforcement, predictive analytics, and transparent information flow- components critical to strategic performance (Chiu & Yang, 2019; Qureshi et al., 2023). In Bakamla's operations, advanced IT platforms improve mission planning, reduce response times, and ensure data-driven decisions in complex maritime zones. Thus:

H4: IT adoption positively influences the Indonesian Coast Guard's organizational performance.

2.5 Strategic alliance performance and organizational performance

Stakeholder theory asserts that an organization's legitimacy and success are closely tied to its ability to meet the expectations of its partners (Freeman et al., 2021). Strategic alliances, when managed effectively, serve as institutional mechanisms that amplify organizational reach, improve public trust, and optimize outcomes (He et al., 2022). For Bakamla, high alliance performance reflects successful coordination, enabling it to demonstrate measurable impact on national maritime safety goals. Consequently:

H5: Strategic alliance performance positively influences the Indonesian Coast Guard's organizational performance.

2.6 Mediating role of strategic alliance performance

Building on network governance and stakeholder theory, it is posited that both interorganizational relations and IT adoption affect organizational performance indirectly through their contributions to alliance quality. High-performing alliances provide platforms for shared learning, efficient task division, and collaborative innovation (Yue et al., 2022). Therefore:

H6: Interorganizational relations indirectly influence the Indonesian Coast Guard's organizational performance through strategic alliance performance.

H7: IT adoption indirectly influences the Indonesian Coast Guard's organizational performance through strategic alliance performance.

3. Method

This research adopts a case-oriented design centered on the Indonesian Coast Guard (Bakamla), which serves as a regulatory and operational hub for maritime coordination. Unlike studies focusing on generic agency interactions, this research situates analysis within the formal, hierarchical structure and national mandate of Bakamla.

3.1 Research context and institutional setting

The Republic of Indonesia Maritime Security Agency (Indonesian Coast Guard) was established in accordance with the mandate of Law Number 32 of 2014 concerning Maritime Affairs, where Article 59 paragraph (3) states that "in the context of law enforcement in waters and jurisdictional areas, especially in carrying out security and safety patrols in Indonesian waters and jurisdictional areas, a Maritime Security Agency is established". The duties of the Indonesian Coast Guard RI are stated in Article 61, namely "conducting security and safety patrols in Indonesian waters and jurisdictional areas of Indonesia". In carrying out these duties, the Indonesian Coast Guard carries out seven functions, one of which is "synergizing and monitoring the implementation of water patrols by related agencies" (Article 62 (d)). In this case, the Indonesian Coast Guard is an institution whose duties include synergizing all maritime stakeholders in achieving maritime security goals.

3.2 Data source

Primary data were collected through structured questionnaires administered to personnel within Bakamla's organizational hierarchy. The target population included structural officers responsible for planning, coordination, and policy execution- totaling 196 individuals across headquarters and two maritime zone offices. A stratified random sampling technique was employed to ensure representativeness across rank and geographic location. Based on a 95 % confidence level and a 5 % margin of error, the minimum sample size was estimated at 130; 136 complete and valid responses were obtained.

Researchers distributed questionnaires offline to respondents at the Bakamla RI Headquarters in Central Jakarta, and offline on the West Maritime Zone and the Central Maritime Zone. Data collection using this approach allows researchers to obtain a high response rate, as well as being better in terms of validity, control, and data quality. This method is very useful for research that requires more accurate and representative answers, although it is more expensive and time-consuming than online methods (Creswell & Clark, 2007).

3.3 Questionnaires design and pilot testing

The questionnaire comprised five sections. The first collected demographic data; the remaining sections measured four constructs: Interorganizational Relations (IOR), IT Adoption (IA), Strategic Alliance Performance (SA), and Organizational Performance (OP). Each construct was assessed using previously validated scales adapted to the Indonesian maritime context and translated into Bahasa Indonesia. Items were scored on a five-point Likert scale (1 = strongly disagree, 5 = strongly agree).

Prior to full deployment, a pilot test was conducted with 30 professionals from maritime agencies and academic institutions to evaluate clarity, relevance, and linguistic accuracy. Feedback from the pilot phase informed the final revision of the questionnaire.

3.4 Data collection procedures

Data were collected offline between May and August 2024 through direct engagement with Bakamla personnel at: the Central Headquarters (Jakarta), the Western Maritime Zone Office (Batam), and the Central Maritime Zone Office (Manado). Offline administration allowed for high response quality, researcher control over data validity, and compliance with institutional access protocols. However, during the visit, it was decided to change the collection process for overseas offices because of low response rate. Completed questionnaires were anonymized and digitally encoded for analysis.

Table 1 Scales used for Inter-Organizational Relations (IOR).

Dimension	Operational definition	Indicators (Outer loading)
Coordination	Efforts to organize and align activities and decisions between individuals or groups to achieve common goals (Castañer & Oliveira, 2020)	IOR01: Planning together (0.810) IOR02: Making decisions together (0.670) IOR03: Relating well to each other (0.785) IOR04: Providing preparatory advice (0.784) IOR05: Encouragement to work together (0.764) Source: Nguyen et al. (2021)
Cooperation	Actions carried out together with the aim of achieving optimal results through organized cooperation (Castañer & Oliveira, 2020)	IOR06: Coordinated activities (0.734) IOR07: On schedule (0.890) IOR08: Discussion of progress together (0.847) IOR09: Ready to help each other (0.824) IOR10: Satisfaction with shared activities (0.771) Source: Nguyen et al. (2021)
Trust	Aspects that encourage the creation of trust between institutions (Ali et al., 2021)	IOR11: Assistance beyond obligations (0.473) IOR12: Involving coordinators (0.863) IOR13: All parties can be relied on (0.856) Source: Ali et al. (2021)

3.5 Measurement scales

The measurement model includes 57 indicators across the four main constructs. Sources and dimensions are: IOR: Coordination, cooperation, trust (Nguyen et al., 2021; Ali et al., 2021), IA: IT infrastructure, strategic alignment, individual learning (Chiu & Yang, 2019), SA: Community

perception, cooperation, cost, internal process, learning & growth (Nguyen et al., 2021), and OP: Formal, quantitative, and qualitative performance (Bakamla, 2022; Tran & Nguyen, 2020). Detailed indicators are provided in **Tables 1 - 4**. The questions from the questionnaire shown in **Tables 1 - 4**.

Table 2 Scales used for IT Adoptions (IA).

Dimension	Operational definition	Indicators (Outer loading)
IT infrastructure	Aspects related to IT usage infrastructure (Chiu & Yang, 2019).	IA01: Hardware budget (0.785) IA02: Software budget (0.799) IA03: Emphasis on the importance of IT (0.773) IA04: Use of advanced technology (0.735) Source: Chiu & Yang (2019)
Strategic alignment	Ensuring that IT is integrated with the organization's long-term goals and plans (Chiu & Yang, 2019)	IA05: IT supports tasks (0.782) IA06: IT according to strategy (0.754) IA07: IT increases efficiency (0.836) IA08: IT increases effectiveness (0.786) Source: Chiu & Yang (2019)
Individual learning	Development of IT skills and knowledge (Chiu & Yang, 2019)	IA09: Training (0.713) IA10: Learning ability (0.813) IA11: Use of IT for work (0.823) IA12: Innovation of new IT functions (0.783) Source: Chiu & Yang (2019)

Table 3 Scales used for Strategic Alliance (SA) Performance.

Dimension	Operational definition	Indicators (Outer loading)
Community aspect	Community perception of joint patrols (Nguyen et al., 2021)	SA01: Increased beneficiaries (0.862) SA02: Community satisfaction (0.899) SA03: Pride in joint patrols (0.835) Source: Nguyen et al. (2021)
Alliance cooperation	Relationships between organizations to achieve common goals (Nguyen et al., 2021)	SA04: Collaboration commitment is getting better (0.859) SA05: Improved image (0.904) SA06: Trust increases (0.873) SA07: Increased stakeholder satisfaction (0.677) SA08: Relationship improvement (0.561) Source: Nguyen et al. (2021)
Cost aspect	Budget management and efficiency in alliance spending (Nguyen et al., 2021).	SA09: Effective budget (0.860) SA10: Efficient budget (0.878) SA11: Economical budget (0.787) SA12: Advantages (0.790) Source: Nguyen et al. (2021)
Internal process of strategic alliance	Interactions and cooperation processes between parties involved in a strategic alliance (Nguyen et al., 2021)	SA13: Sharing resources (0.846) SA14: Learning from each other (0.789) SA15: Shared strategies (0.724) SA16: More self-confidence (0.758) Source: Nguyen et al. (2021)
Learning and growth	Progress and development of alliance member organizations (Nguyen et al., 2021).	SA17: More productive (0.826) SA18: More satisfied (0.911) SA19: Quality improved (0.864) Source: Nguyen et al. (2021)

Table 4 Scales used for Coast Guard Organizational Performance (OP).

Dimension	Operational Definition	Indicators (Outer Loading)
Formal performance	Explicit performance indicators in Bakamla's performance report (Bakamla, 2022)	OP01: Crime cases (0.421) OP02: Policy quality (0.797) OP03: Law enforcement (0.828) OP04: Cooperation with other institutions (0.699) OP05: Readiness of facilities and infrastructure (0.754) OP06: Bureaucratic reform (0.824) Source: Bakamla (2022)
Quantitative performance	Indicators related to quantity (Tran & Nguyen, 2020)	OP07: Quantity of work (0.855) OP08: Quality of work (0.899) OP09: Number of innovations (0.831) Source: Tran & Nguyen (2020)
Qualitative performance	Indicators related to quality (Tran & Nguyen, 2020)	OP10: Reputation (0.690) OP11: Goal achievement (0.877) OP12: Work efficiency (0.900) OP13: Work enthusiasm (0.750) Source: Tran & Nguyen (2020)

3.6 Data analysis strategy

The data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) via SmartPLS 3.3.3. This method is appropriate for exploratory research involving complex models, non-normal data distributions, and moderate sample sizes (Hair et al., 2019). The analysis included both measurement model assessment (validity and reliability tests) and structural model evaluation (hypothesis testing).

Data from data collection is prepared and checked. Once ready, the data is used to build a measurement model. This measurement model is then checked with a number of parameters. If the model meets the thresholds, it will proceed to the structural model assessment. If not, the model will be reconfigured until it finally meets the requirements to proceed to the structural model analysis.

The parameters used are convergent validity, reliability, and discriminant validity. Loading value of each item and AVE (average variance extracted) values is used as an indicator of convergent validity. An item is considered convergently valid if the outer loading value is greater than or equal to 0.708 or the AVE value of the variable/construct is greater than or equal to 0.5 (Hair et al., 2021). The loading value is allowed to be greater than or equal to 0.4 as long as the AVE of the variable/construct is greater than or equal to 0.5. The reliability analysis uses two parameters, namely the Cronbach's alpha and Composite Reliability. All values must be more than 0.700 to be said to meet the reliability requirements. Discriminant validity uses HTMT (Heterotrait Monotrait) criteria analysis, which must be less than 0.9. The output of the structural model analysis is an estimate of the significance level of the path coefficients that make up the model, which generally uses t-value > 1.96 and p-value < 0.05. **Figure 1** illustrates the methodological framework of this research.

4. Results

The respondents (n = 136) were structural personnel from the Indonesian Coast Guard (Bakamla), representing both headquarters and regional maritime zones. The demographic profile indicates that 86 % of the respondents were male, predominantly within the 21 - 30 age group (59 %). Educational backgrounds varied, with the majority holding bachelor's degrees (46 %), followed by high school (30 %) and master's degrees (10 %). Equal representation from headquarters and regional offices was maintained to ensure geographic diversity (see **Table 5**).

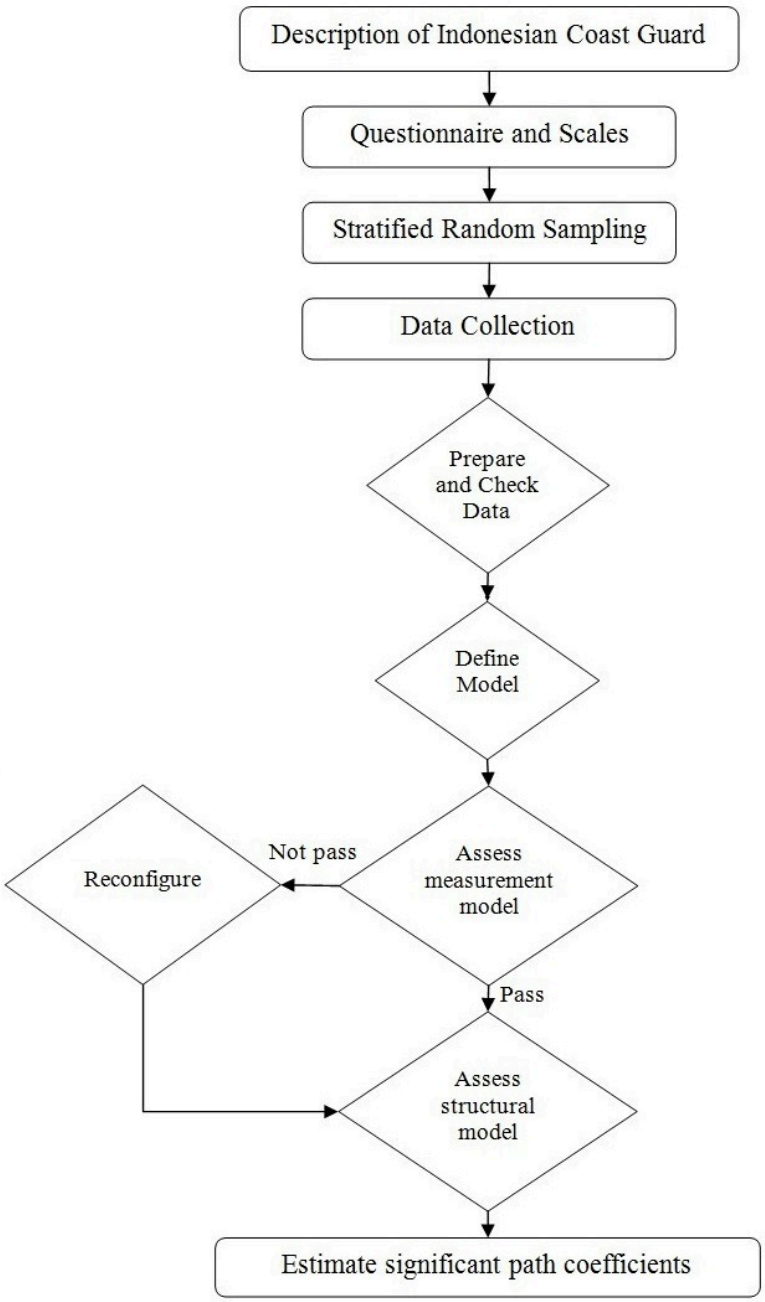


Figure 1 Methodological framework.

4.1 Reliability and validity of the model

The reliability and validity of the measurement model were first established. All constructs demonstrated acceptable levels of internal consistency, with Cronbach's alpha and Composite Reliability (CR) exceeding the 0.70 threshold. Convergent validity was confirmed through Average Variance Extracted (AVE) values, all above the recommended 0.50 level (see **Table 6**). Discriminant validity, assessed via the HTMT criterion, flagged a few high inter-dimensional correlations, especially among closely related subcomponents of the strategic alliance construct. However, since these were second-order models, such correlations were deemed theoretically justified.

Notably, items with low outer loading values- including two from the trust dimension (IR11), alliance cooperation (SA07, SA08), and organizational performance (OP01, OP04, OP10)- were removed to improve model fit and clarity. These modifications enhanced the robustness of the constructs without compromising theoretical integrity.

Table 5 Demographics of respondents (n = 136).

Variables	Frequency	Percentage
Sex		
Male	117	86
Female	19	14
Office		
Central office	68	50
Branch office	68	50
Education		
Senior high school	41	30
Diploma	17	12
Bachelor degree	63	46
Master degree	13	10
Military education	2	1
Age range		
21 - 30 years	81	59
31 - 40 years	42	31
41 - 50 years	5	4
51 - 60 years	8	6

Table 6 Results of convergent validity and reliability tests.

	Cronbach's α	CR	AVE
Interorganizational relations	0.889	0.916	0.646
Strategic alliance	0.869	0.902	0.606
Cost aspect	0.849	0.898	0.688
Community aspects	0.832	0.899	0.749
Moderation effect	1.000	1.000	1.000
Coordination	0.794	0.865	0.617
Alliance cooperation	0.853	0.910	0.771
Indonesian coast guard performance	0.920	0.932	0.519
Formal performance	0.820	0.871	0.539
Qualitative performance	0.846	0.898	0.688
Quantitative performance	0.827	0.897	0.743
Cooperation	0.872	0.908	0.664
Learning and growth	0.835	0.901	0.752
Trust	0.646	0.849	0.738
Strategic alliance internal process	0.785	0.861	0.609
IT adoption	0.775	0.899	0.817
IT infrastructure	0.777	0.847	0.581
Individual learning	0.790	0.862	0.611
Strategic alignment	0.799	0.867	0.621

4.2 Hypothesis verification

The structural model revealed several key insights into the relational dynamics between variables (see **Table 7**). Both interorganizational relations (IOR) and IT adoption were found to significantly predict strategic alliance performance. Specifically, IOR had a standardized path coefficient of $\beta = 0.447$ ($p < 0.001$), while IT adoption showed $\beta = 0.332$ ($p < 0.001$). These findings indicate that the ability to coordinate across agencies and deploy digital infrastructure effectively contributes directly to stronger alliance performance among maritime security actors.

In contrast, neither IOR nor IT adoption exhibited a significant direct effect on the Indonesian Coast Guard's overall organizational performance. The path coefficients were $\beta = 0.063$ ($p = 0.505$) for IOR and $\beta = 0.075$ ($p = 0.386$) for IT adoption, both statistically insignificant. These results suggest that the operational benefits of collaboration and technology do not automatically translate into institutional performance gains without an effective alliance mechanism.

Table 7 Hypothesis test results.

Hypothesis	Connection	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values	Conclusion
1	Interorganizational relations -> Strategic Alliance	0.447	0.446	0.074	6.019	0.000	Accepted
2	Interorganizational relations -> Indonesian Coast Guard Performance	0.063	0.062	0.095	0.667	0.505	Rejected
3	IT Adoption -> Strategic Alliance	0.332	0.326	0.064	5.19	0.000	Accepted
4	IT Adoption -> Indonesian Coast Guard Performance	0.075	0.078	0.086	0.866	0.386	Rejected
5	Strategic Alliance -> Indonesian Coast Guard Performance	0.478	0.486	0.097	4.944	0.000	Accepted

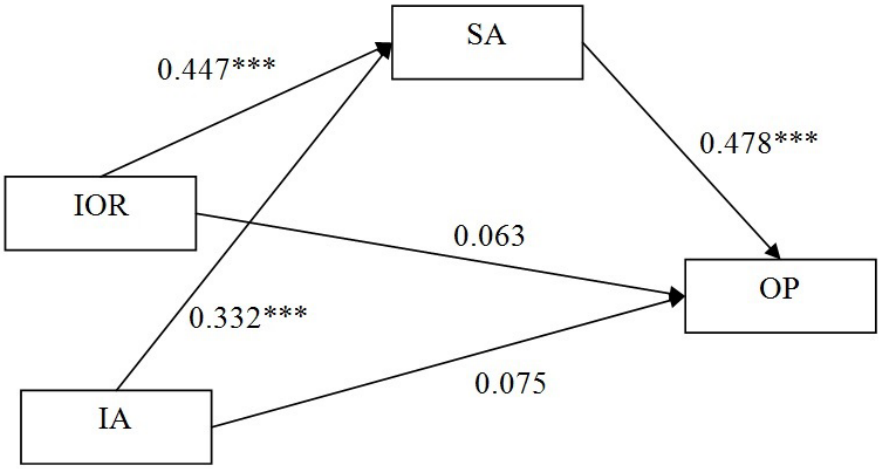
Table 8 Mediation test results.

Hypothesis	Connection	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values	Conclusion
1	Interorganizational relations -> Strategic Alliance -> Indonesian Coast Guard Performance	0.214	0.217	0.060	3.542	0.000	Full mediation
2	IT Adoption -> Strategic Alliance -> Indonesian Coast Guard Performance	0.159	0.159	0.044	3.605	0.000	Full mediation

A major finding of this study is the mediating effect of strategic alliance performance (see **Table 8**). Mediation analysis confirmed that strategic alliance performance acts as a full mediator for both interorganizational relations ($\beta = 0.214$, $p < 0.001$) and IT adoption ($\beta = 0.159$, $p < 0.001$) in their relationship with organizational performance. This highlights the critical role of structured collaboration in converting inter-agency coordination and digital capacity into meaningful institutional outcomes.

Out of the seven hypotheses proposed, five were fully supported: H1 and H3 confirmed that IOR and IT adoption enhance alliance performance; H5 demonstrated that alliance performance strongly influences organizational performance; H6 and H7 validated the full mediation effect of alliance performance in bridging IOR and IT adoption with organizational performance; and H2 and H4, which posited direct effects of IOR and IT adoption on performance, were rejected. **Figure 2**

illustrates the final model with corresponding p-values and path coefficients, offering a visual summary of all tested relationships.



Note: *** = $p < 0.001$
Figure 2 The final model.

5. Discussion

This study offers new insights into the dynamics of maritime governance in Indonesia by examining how interorganizational relations (IOR) and IT adoption contribute to organizational performance through the mediating role of strategic alliance performance. Contrary to conventional assumptions, the findings suggest that neither IOR nor IT adoption exert a direct effect on the organizational performance of the Indonesian Coast Guard. Instead, their influence is realized only through well-functioning strategic alliances, which serve as institutional mechanisms that convert collaborative intentions into operational outcomes.

5.1 Interorganizational relations and structural constraints

The absence of a direct relationship between IOR and organizational performance highlights the structural limitations inherent in Indonesia's maritime governance. While prior literature often frames collaboration as inherently beneficial (He et al., 2022), this study underscores that collaboration without systemic alignment may yield only symbolic rather than substantive outcomes. Indonesia's maritime institutions operate under overlapping mandates and sectoral autonomy, leading to governance fragmentation (Lay & Astrina, 2020). As a result, coordination efforts are frequently stalled by jurisdictional ambiguity and decision-making inertia.

The findings of this study align with Agastia et al. (2024), who emphasize that Bakamla's coordination challenges stem not from lack of intent but from structural and informational asymmetries among agencies**.** Similarly, Laksmana (2022) shows that the absence of unified command, compounded by sectoral competition among TNI AL, KPLP, and other agencies, limits the institution's effectiveness despite an expanding mandate. While interorganizational relations significantly enhance strategic alliance performance, their direct effect on organizational performance remains muted due to weak institutional authority and fragmented accountability structures-confirming that relational strength alone cannot offset systemic fragmentation.

This finding aligns with the perspective of network governance theory, which posits that collaboration among autonomous actors must be underpinned by shared accountability structures, mutual trust, and standardized information flow (Provan & Kenis, 2007). In the absence of such

formal scaffolding- such as interagency agreements, data integration protocols, or harmonized enforcement standards- interorganizational collaboration may remain superficial or redundant. Thus, enhancing institutional performance requires more than interpersonal or interdepartmental goodwill; it necessitates legal, procedural, and technological convergence across agencies.

However, this finding also complicates the assumptions of network governance theory, which often presumes that increased relational density leads to greater performance. Indeed, while network governance emphasizes interconnectedness (Kapucu & Hu, 2020), the findings mirror insights from Lee and Ospina (2022), who demonstrate that accountability in horizontally dense governance networks becomes more complex and harder to manage. Meanwhile, empirical evidence from water governance in China suggests that lower network density can yield better performance, because overly dense networks risk role overlap and coordination overload (Cui & Yi, 2020). Furthermore, the literature indicates that, as network size and actor count rise, governance effectiveness declines unless governance structures adapt- large networks without centralized coordination struggle under relational complexity (Shumate et al., 2023). Thus, while collaboration is necessary, excessive horizontal connectivity without hierarchical clarity can undermine efficiency- a nuance that extends current theoretical debates on the optimal balance between autonomy and centralization in public-sector networks.

5.2 IT adoption and digital asymmetries

The finding that IT adoption alone does not significantly enhance organizational performance further challenges the narrative that technological investments automatically lead to efficiency and effectiveness. Drawing on the dynamic capabilities perspective (Teece, 2023), IT adoption should theoretically enhance responsiveness, agility, and coordination. However, in the case of Bakamla, the utility of IT appears contingent upon several institutional conditions: digital literacy, cross-agency system compatibility, and operational integration.

The Indonesian Maritime Information Center (IMIC) represents a critical, yet underutilized, digital infrastructure. Although IMIC enables real-time tracking and data visualization, its effectiveness depends on continuous data input from partner institutions and interoperability with TNI AL and KKP systems (Nirmala & Long, 2020). This underscores that IT adoption, in isolation, cannot enhance organizational outcomes unless accompanied by shared governance protocols and institutional trust (Surucu-Balci et al., 2024). The case of IMIC illustrates how even advanced systems fail to deliver full value when institutional cooperation and data governance lag behind technological capability.

This result resonates with the concerns raised by Harish et al. (2024) and Okafor-Yarwood et al. (2024) who argue that, in maritime environments, IT tools such as automated surveillance or data dashboards cannot substitute for governance structures that ensure data is used strategically. In Indonesia, disparities in digital maturity across maritime agencies limit the value of interoperable systems. For example, while Bakamla may invest in predictive patrolling software, these tools are ineffective unless other agencies input timely data, share maritime domain awareness, and adopt the same digital platforms.

The implication is clear: digital transformation must be synchronized across institutions and embedded within organizational workflows- not implemented in silos. Fragmented IT implementation, even if well-funded, may result in isolated innovation rather than systemic improvement. By integrating this empirical reality, this study highlights that the value of IT-enabled collaboration emerges not from technology itself, but from the institutional arrangements and policy coherence that sustain it.

5.3 Strategic alliance performance as a conduit

The finding that strategic alliance performance mediates the relationship between both IOR and IT adoption with organizational performance suggests that alliances function as institutional

converters- turning disparate capacities into coordinated impact. In the Bakamla context, strategic alliances take the form of joint patrols, integrated inspections, and interagency coordination units. These activities require more than surface-level interaction- they demand shared objectives, resource pooling, and communicative trust.

This is consistent with the work of Sunko et al. (2024), who showed that maritime alliance performance is closely linked to successful operational integration in contexts with multiple stakeholders and resource asymmetries. Furthermore, Domergue (2025) emphasizes that collaboration in archipelagic states must be formalized through national frameworks that enable joint operations, distributed intelligence, and shared rules of engagement.

This study suggests that the value of IOR and IT adoption is only unlocked when they are embedded within a strategic alliance framework that institutionalizes coordination. In this light, alliances are not merely cooperative arrangements, but platforms for structural alignment- both human and technological.

5.4 Additional observations: Human capital and demographic constraints

The demographic profile of the respondents- dominated by younger male officers- points to potential limitations in representational diversity within Bakamla's leadership and operational units. Prior research, such as Tang (2023) and Freedman (2022), indicates that gender disparities and limited access to education and leadership roles may weaken organizational capacity to innovate and adapt. These structural constraints should be considered in future alliance design and institutional development initiatives.

Moreover, the geographic dispersion of Indonesia's maritime zones imposes significant operational challenges. Many regional units function with varying degrees of autonomy and technological readiness, resulting in uneven implementation of national coordination policies. These territorial and infrastructural asymmetries must be accounted for when designing alliances, especially in areas like the Malacca Strait or Sulawesi Sea, where transnational threats require high-frequency collaboration.

5.5 Theoretical and practical contributions

Theoretically, this study extends network governance theory by demonstrating that interorganizational relations and IT adoption do not directly enhance institutional performance, but instead operate through the mediating role of strategic alliance performance. This mechanism illustrates how alliances translate internal capabilities- such as coordination and digital infrastructure- into collective institutional outcomes within public-sector security settings. The study also advances the resource-based view (RBV) by showing that IT adoption becomes a true performance driver only when embedded within interorganizational coordination frameworks that institutionalize data sharing, interoperability, and mutual trust.

Practically, the findings call for a multi-pronged reform agenda to strengthen alliance governance and digital integration across Indonesia's maritime sector. This includes formalizing interagency collaboration through binding agreements and interoperable legal instruments, establishing joint IT standards and real-time data exchange protocols, and developing human capital through targeted leadership programs in digital collaboration and cross-sectoral negotiation. Furthermore, organizations should institutionalize interoperability mechanisms- such as joint patrol centers, integrated information platforms, and cross-training initiatives- to enhance operational coherence in complex maritime environments.

Together, these contributions clarify how structural and relational mechanisms jointly determine the effectiveness of maritime governance. They not only enrich theoretical debates on digital-era public administration but also provide actionable guidance for policymakers seeking to improve coordination, accountability, and technological synergy among Indonesia's maritime enforcement institutions.

6. Limitations and further research

Despite these contributions, this study has several limitations that should be acknowledged. First, its empirical scope is confined to the Indonesian Coast Guard (Bakamla), which operates under a unique regulatory and institutional framework. As such, the findings may not be directly generalizable to other maritime or security organizations that differ in legal authority, resource structure, or interagency culture. Second, the research employs a cross-sectional design, which restricts the ability to establish causal relationships between interorganizational relations, IT adoption, and performance outcomes. Longitudinal or mixed-method approaches could better capture the dynamic evolution of alliances and digital integration over time. Third, the study relies primarily on perceptual data obtained through self-reported questionnaires. While this method provides valuable insight into organizational attitudes and internal dynamics, it is subject to potential response bias and may not fully reflect objective performance indicators.

To address these limitations, future research could expand the scope to include comparative analyses across multiple maritime or public security agencies, to incorporate time-series or panel data to observe longitudinal effects, and to triangulate perceptual measures with archival or operational performance data. Additionally, integrating policy-level variables, such as regulatory coherence, legal harmonization, and stakeholder legitimacy, would enrich understanding of how institutional contexts shape alliance effectiveness in maritime governance.

7. Conclusions

This study provides empirical evidence that interorganizational relations and IT adoption significantly contribute to the performance of strategic alliances within the Indonesian Coast Guard. These findings reinforce the role of strategic alliances not merely as collaborative arrangements, but as institutional mechanisms that enable integrated enforcement, digital interoperability, and resource optimization in the maritime sector. Contrary to traditional assumptions, internal capabilities alone- such as strong interagency ties or technological investments- do not guarantee organizational effectiveness. Rather, performance improvements occur when such capabilities are embedded within sustained, trust-based alliances that promote shared accountability and data-driven coordination. This insight is particularly salient for maritime institutions operating within fragmented regulatory environments. For institutional leaders and maritime policymakers, this underscores the importance of designing governance frameworks that facilitate alliance continuity, standardized communication protocols, and shared technological platforms. Strengthening these relational infrastructures is critical for translating cross-agency initiatives into measurable organizational value.

CRediT author statement

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