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PHAM QUANG GIAP

STATE MANAGEMENT OF MARITIME SAFETY ASSURANCE IN VIETNAM

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INTRODUCTION

1. Rationale for the study

In the context of ever-expanding international supply chains, maritime transport continues to play a dominant role in the circulation of global trade. In line with this trend, maritime safety is no longer understood merely as an isolated technical issue; rather, it has become the composite outcome of an institutional system, organizational arrangements, public services, and modern technical infrastructure operating in real time and aligned with international standards, digital transformation, green shipping, and risk governance.

For Vietnam, with its important maritime geopolitical position, long coastline, widely distributed seaport system, and very high share of import–export cargo transported by sea, maritime safety assurance (MSA) is both a condition for risk prevention and a form of "soft infrastructure" that plays a decisive role in national competitiveness, logistics efficiency, the quality of international trade connectivity, and the sustainable development of the marine economy. The safe and smooth operation of the system of aids to navigation, shipping channels, pilotage, maritime information, vessel traffic coordination, and search and rescue directly affects human life safety, vehicle safety, marine environmental protection, and the country's reputation in international integration.

However, the practice of state management of MSA in Vietnam still reveals many shortcomings. Financial mechanisms for public services and infrastructure maintenance have not truly created incentives for innovation; the legal framework for socializing investment in infrastructure and service provision remains insufficiently synchronized; current supervision still focuses more heavily on input control and administrative procedures than on results- and risk-based governance; data systems remain fragmented; and the application of digital technology in supervision, operation, and service-quality assessment remains disproportionate to the sector's development requirements. These limitations have become obstacles to the modernization and deeper integration of Vietnam's maritime sector.

From an academic perspective, previous domestic studies have often approached MSA from the angles of maritime engineering, specialized law, or isolated organizational models, but have not deeply analyzed the nature of this field from the perspective of state management as an integrated whole encompassing both management of the MSA system and management of the provision of MSA services. There remains a theoretical gap regarding the renewal of organizational, service-delivery, and regulatory models for MSA in accordance with the principles of New Public Management, risk governance, data-driven governance, and sustainable development. The absence of a scientific analytical framework for addressing the

relationship between the State and public service units and service-providing enterprises is one reason why management reform in this field has not matched its potential.

Arising from these practical requirements and the above theoretical gap, the doctoral candidate selected the topic "State Management of Maritime Safety Assurance in Vietnam" for study. The dissertation aims to build a scientific foundation for proposing a system of solutions to improve state management of MSA through 2030, with a vision to 2045, thereby contributing to the modernization of the maritime sector and ensuring security, safety, and the sustainable development of Vietnam's marine economy under conditions of international integration.

2. Research objectives and tasks

2.1. Research objective

The dissertation aims to clarify the theoretical and practical foundations of state management in maritime safety assurance in Vietnam; to analyze and evaluate the current situation; and, on that basis, to propose orientations and solutions for further improvement through 2030, with a vision to 2045.

2.2. Research tasks

First, to review domestic and international studies related to state management of MSA, clarify what has already been studied, identify research gaps, and define the dissertation's research direction.

Second, to synthesize and systematize the theoretical foundations and international experience in state management of MSA; on that basis, to develop an analytical framework and a set of evaluation criteria appropriate to Vietnam's conditions.

Third, to analyze and evaluate the state of state management of MSA in Vietnam during 2015–2025, clarifying achievements, limitations, and the causes of those limitations.

Fourth, the dissertation tests the extent to which these variables influence management outcomes through quantitative methods, thereby providing additional empirical evidence to substantiate the conclusions drawn from the theoretical and situational analyses.

Fifth, the dissertation proposes a coherent system of solutions and recommendations aimed at improving state management in maritime safety assurance in Vietnam through 2030, with a vision to 2045.

3. Research object and scope

3.1. Research object

The research object of the dissertation is the set of state-management activities relating to MSA in Vietnam.

3.2. Research scope

In terms of the managing authority, the dissertation focuses on the Ministry of Construction as the body assigned by the Government to advise on policy making and to directly perform state management of MSA; before the institutional merger in March 2025, the corresponding authority was the Ministry of Transport.

In terms of content, the dissertation approaches state management of MSA through two core contents: (i) the organization and management of the MSA system; and (ii) the management of the provision of MSA services. For each content area, the dissertation analyzes three state-management functions: promulgation, implementation, and supervision/evaluation.

In terms of space, the study is conducted within the territory of Vietnam while also drawing comparisons with selected international models such as Singapore, Japan, Malaysia, the Netherlands/EU, and several representative African cases in order to derive lessons for Vietnam.

In terms of time, the dissertation analyzes the current situation during 2015–2025 and proposes solutions through 2030, with a vision to 2045. The quantitative survey was conducted in 2025.

4. Research methodology

The dissertation is grounded in management science and modern public governance, combining public-economics thinking, New Public Management, and risk governance, and employs a mixed-methods research design. On the qualitative dimension, the dissertation uses document analysis, semi-structured in-depth interviews with 25 experts, and comparative international research to clarify the institutional context, management characteristics, and practical issues of the MSA field.

At the quantitative level, the dissertation is based on 250 valid survey responses. The data were processed using Python to test the reliability of the measurement scales, construct composite variables, and estimate a multiple linear regression model based on the variables derived from the 2×3 analytical framework, thereby quantifying the extent to which H1, H2, H3, D1, D2, and D3 affect the outcomes of state management in maritime safety assurance. This approach enables the dissertation to ensure analytical depth while at the same time enhancing the empirical rigor and practical applicability of the research findings.

5. New contributions of the dissertation

5.1. Theoretical contribution

The dissertation develops an integrated 2×3 analytical framework for state management of MSA, combining two management contents—system management and service-provision management—with three state-management functions: promulgation, implementation, and supervision/evaluation. This framework helps overcome the fragmented approaches of previous studies while providing a unified

basis for identifying the research object, assessing the current situation, operationalizing evaluation criteria, and systematizing the groups of influencing factors under Vietnam's conditions.

5.2. Practical contribution

The dissertation clarifies the achievements, principal limitations, and causes of limitations in state management of MSA in Vietnam during 2015–2025. The findings indicate that the quality of implementation in system management and the quality of promulgation in system management exert the strongest impacts on state-management outcomes, whereas the quality of system supervision and the quality of promulgation in service management do not exhibit clear statistical significance in the model. On that basis, the dissertation proposes a system of solutions for improvement through 2030, with a vision to 2045, and also proposes a KPI set for monitoring and evaluating management outcomes.

6. Structure of the dissertation

In addition to the Introduction, Conclusion, References, and Appendices, the dissertation consists of four chapters:

Chapter 1: Literature review related to the topic of state management of maritime safety assurance.

Chapter 2: Theoretical foundations and international experience in state management of maritime safety assurance.

Chapter 3: The current state of state management of maritime safety assurance in Vietnam.

Chapter 4: Solutions for improving state management of maritime safety assurance in Vietnam.

Chapter 1
LITERATURE REVIEW RELATED TO THE TOPIC OF STATE MANAGEMENT OF MARITIME SAFETY ASSURANCE

1.1. STUDIES ON THE ORGANIZATION AND MANAGEMENT OF THE MSA SYSTEM

1.1.1. Studies on the promulgation of mechanisms, laws, and system planning for MSA

Existing studies show that the institutional framework for state management of the MSA system has attracted attention along three major directions.

The first direction approaches maritime infrastructure as a critical national asset, requiring the State to establish comprehensive regulatory and risk-prevention mechanisms, including both economic security and technical safety. Many international studies emphasize the necessity of controlling risks arising from foreign investment, standardizing state-management authority, and domesticating international obligations in the protection of maritime infrastructure.

The second direction focuses on the need to update the legal framework and technical standards in a synchronized manner under the impact of digital transformation, e-navigation, autonomous ships, digital data, and maritime cybersecurity. Research findings show that state management agencies can no longer merely issue framework regulations; they must also design data architecture, technical standards, and regulatory procedures appropriate to new technologies.

The third direction provides empirical evidence in the Vietnamese context, clarifying the boundaries among state-management responsibility, technical responsibility, and service-provision responsibility. It thus indicates the remaining gap: the absence of an infrastructure-asset life-cycle management framework for MSA and the lack of a specialized set of criteria for assessing the quality of promulgation in state management of the MSA system.

1.1.2. Studies on the implementation of management of the MSA system

Studies on the implementation of management of the MSA system focus on three main groups of issues.

The first concerns organizational management models and inter-agency coordination mechanisms. Many studies indicate that implementation effectiveness depends not only on the organizational structure but also on the capacity for coordination, decentralization, and inter-sectoral cooperation, especially in the context of dynamic risks and the need for rapid response.

The second concerns the trend toward comprehensive digitalization in system management. The roles of AIS, VTS, e-navigation, digital twins, information infrastructure, and interoperable data are emphasized as essential conditions for

improving the effectiveness of system management, maintenance, scheduling, and supervision.

The third consists of empirical studies in Vietnam showing many valuable technical experiences related to channel operations, the organization of VTS operation, and the application of e-navigation; however, a clear gap remains between the layer of technical operation and the layer of state management. Accordingly, the research gap here lies in the absence of a concrete model of management decentralization, the lack of inter-actor coordination mechanisms, and the absence of a digital asset-data governance framework at the state-management level.

1.1.3. Studies on supervision and evaluation of the MSA system

This body of research reflects a shift from traditional ex-post supervision toward predictive, data-based risk supervision. It can be summarized into three approaches.

The first is dynamic risk monitoring through AIS, VTS, AI, and big data, enabling the early identification of collision risks, anomalies, or unsafe conditions on shipping routes.

The second is the monitoring of the technical integrity and digital integrity of the system, including cybersecurity risks, signal spoofing, equipment failures, data discrepancies, and inconsistencies between actual infrastructure conditions and recorded data.

The third is the measurement of compliance and accountability at the system level. However, the gap is that current technical tools are still used mainly for operational supervision and have not yet been fully integrated into the supervision, inspection, and policy-feedback processes of state management agencies; nor has a specialized KPI set been established to assess the quality of supervision by the state management agencies themselves.

1.2. STUDIES ON THE MANAGEMENT OF THE PROVISION OF MARITIME SAFETY ASSURANCE SERVICES

1.2.1. Studies on the promulgation of mechanisms and policies for MSA services

Research shows that the design of mechanisms for the provision of MSA services is a central content of state management, especially for pilotage, maritime information services, VTS, and navigational support services.

Many international studies emphasize the requirement to establish specialized regulatory frameworks for each type of service, standardize professional competence, standardize data structures, response times, and the limits of liability among the parties. Domestic studies provide many important references on state-management tools, behavioral factors, and safety-control requirements in maritime services.

However, the most prominent gap is the absence of a synchronized design for the catalog of MSA services together with output standards, SLA/KPI metrics, and quality-regulation mechanisms suited to modern state-management conditions.

1.2.2. Studies on the implementation of management of the provision of MSA services

Studies on the implementation of MSA services primarily view services as socio-technical systems. Findings show that service quality depends not only on the individual competence of service personnel but also on organizational structure, coordination procedures, licensing mechanisms, field-level coordination, data regimes, and the operating environment.

Many studies clarify the role of data flows in service coordination and affirm the need to move from the isolated management of individual stages to the governance of a unified service supply chain. The current gap lies in the lack of a legal-administrative model for provider selection, public contract management, accountability supervision, and data interoperability among actors within the same service chain.

1.2.3. Studies on supervision and evaluation of the quality of MSA services

Existing studies show that the supervision of MSA service quality is shifting from administrative ex-post inspection to continuous measurement through data. Many evaluation models propose a combination of output standards, process measurement, and feedback-improvement mechanisms. Some studies also emphasize the importance of user feedback, real-time supervision, and the evaluation of operational behavior.

Nevertheless, most existing indicator systems primarily serve the internal evaluation of service providers. The major gap in this field is the failure to build a KPI system, SLA framework, and supervision–acceptance–sanction cycle specifically for state management agencies in relation to MSA services.

1.3. EVALUATION OF THE RESULTS OF THE LITERATURE REVIEW

1.3.1. Review findings

The review findings show that domestic and international studies have established an important scientific foundation relating to institutions, technology, services, data, and risk governance in the maritime sector. Internationally, the prominent trend is a shift from purely administrative management toward governance based on risk, data, output quality, and accountability. In Vietnam, many studies have clarified the technical and legal dimensions of MSA, but an integrated approach from the perspective of state management remains lacking.

It can therefore be affirmed that MSA is not merely a technical or isolated legal issue, but also a matter of sector-specific public governance requiring a

combination of institutions, organization, resources, data, technology, and implementation capacity.

1.3.2. Research gaps and the dissertation's research direction

Through the review, the dissertation identifies four principal gaps.

First, there is no integrated analytical model capable of simultaneously examining the two management contents—system and services—together with the three state-management functions of promulgation, implementation, and supervision/evaluation.

Second, there is a lack of a system of criteria for measuring state-management outcomes at the ministerial level, while existing indicators mainly measure technical performance or the operational quality of service-providing units.

Third, modern governance models have mainly been developed in international contexts and have not yet been adequately validated under Vietnam's institutional conditions, resource constraints, data infrastructure, and administrative restructuring process.

Fourth, empirical research methods based on primary data remain limited; there is still a lack of a coherent combination of document analysis, in-depth interviews, and broad-based surveys.

On the basis of these gaps, the dissertation chooses the following research direction: systematizing the theoretical foundations; developing the 2×3 analytical framework; formulating a set of criteria/KPIs; analyzing the state of state management of MSA in Vietnam during 2015–2025; and employing a mixed-methods approach to propose a feasible system of solutions.

Chapter 2
THEORETICAL FOUNDATIONS AND INTERNATIONAL EXPERIENCE IN STATE MANAGEMENT OF MARITIME SAFETY ASSURANCE

2.1. OVERVIEW OF MARITIME SAFETY AND MARITIME SAFETY ASSURANCE

2.1.1. The concept of maritime safety

Maritime safety is the state in which risks arising from maritime activities are controlled at an acceptable level through the system of international rules and technical standards established by the IMO and related institutions. From the perspective of state management, maritime safety is not merely the product of navigation techniques or ship inspections; it is the outcome of an inter-sectoral public-governance process in which the State plays the roles of domesticating, regulating, implementing, and supervising international standards.

Maritime safety has the following basic characteristics: globality; multidimensionality in legal, technical, organizational, and social terms; dynamism associated with risk governance; a multiplicity of actors; and an increasingly deep trend toward digitalization, especially under the impact of e-navigation, big data, and cybersecurity.

2.1.2. The concept of maritime safety assurance

If maritime safety is the target state, then maritime safety assurance is the institutional–organizational–technical mechanism through which that state is maintained in practice. MSA is a system of continuously operating public services and data designed to minimize risks and to ensure stable, smooth, and sustainable transport flows. From the perspective of state management, it is the responsibility of the coastal State to organize, maintain, and control essential public services such as aids to navigation, maritime safety information, vessel traffic management, pilotage, and search and rescue.

MSA has the following characteristics: it is an essential public service; it is inter-sectoral and multi-actor; it is based on digital data and modern technology; and it carries both preventive and recovery-oriented implications aimed at maintaining the transport chain even when incidents occur.

2.1.3. The role of maritime safety assurance

MSA plays a crucial role in the sustainable development of maritime transport and the marine economy. First, it is a condition for protecting people, vessels, cargo, maritime works, and the marine environment. Second, it contributes to ensuring the continuity of international trade, maintaining supply-chain reliability, and reducing logistics costs. Third, it is a condition for enhancing a nation’s reputation, competitiveness, and integration capacity. Fourth, MSA also serves as an instrument

for supporting the exercise of sovereignty, protecting national interests, and maintaining order and safety at sea.

2.2. STATE MANAGEMENT OF MARITIME SAFETY ASSURANCE

2.2.1. General overview

State management of maritime safety assurance is the process by which state management agencies promulgate, implement, and supervise the organization and management of the MSA system and the provision of MSA services in order to maintain safe, smooth, and sustainable conditions for maritime activities. This activity carries both the character of public authority in lawmaking and enforcement and that of a highly technical public service, requiring precision, efficiency, transparency, and accountability.

In terms of actors, state management in this field commonly includes central policy-making bodies, specialized regulatory agencies, focal authorities at ports and waters, and technical operating and service-providing units. In terms of scope, state management of MSA covers both the legal and technical domains; it is not limited to waters under national jurisdiction but is also associated with obligations of international cooperation and connectivity.

The general objective of state management of MSA is to ensure a high level of safety for maritime activities, protect human life, vessels, cargo, and the marine environment, and at the same time ensure smooth maritime traffic in support of trade growth and the sustainable development of the marine economy.

State management of MSA has several basic features: it is an inter-sectoral and highly internationalized field; it constitutes an essential public service; it involves a combination of the public and private sectors; it operates on the basis of international standards; and it is increasingly influenced by digital transformation, big data, artificial intelligence, and cybersecurity requirements.

Modern management trends are shifting from a model based on norms and periodic inspection toward a governance model based on services, data, risk, and accountability, in which the State plays the roles of enabler, regulator, and supervisor.

2.2.2. Contents of state management of maritime safety assurance

The dissertation identifies the contents of state management of MSA according to a 2×3 matrix. The two content areas are: (i) the organization and management of the MSA system; and (ii) the management of the provision of MSA services. The three state-management functions are promulgation, implementation, and supervision/evaluation.

On the system axis, the promulgation function includes the issuance of legal documents, plans, technical regulations, standards, techno-economic norms, and financial mechanisms related to infrastructure, aids to navigation, shipping channels,

hydrography, data, and coordination. The implementation function includes the management of investment, operation, maintenance, upkeep, digitalization of asset data, system operation, and technical human-resource training. The supervision function includes inspection, examination, quality acceptance, monitoring of operational status, incident investigation, risk control, and policy feedback.

On the service axis, the promulgation function includes establishing the service catalog, quality standards, service conditions, financial mechanisms, and human-resource competency standards. The implementation function includes ordering, tendering, assignment of tasks, coordination of service provision, licensing, training, the application of digital technology, and contract management. The supervision function includes monitoring SLA/KPI performance, service acceptance and settlement, field inspection, violation handling, satisfaction assessment, and provider ranking.

2.2.3. Evaluation criteria and influencing factors

On the basis of the 2×3 framework, the dissertation develops a system of criteria for evaluating state management of MSA consisting of six groups corresponding to the six dimensions H1, H2, H3, D1, D2, and D3. This set of criteria is linked to a group of 30 KPIs in order to quantify management outcomes on both the system and service axes.

The dissertation also identifies seven groups of factors influencing state management of MSA: institutions and law; organizational apparatus and human resources; finance and resources; science, technology, and data; international and regional cooperation; infrastructure and response capacity; and the socio-economic context. These factors interact multidimensionally and may become either drivers or bottlenecks for management outcomes.

2.3. INTERNATIONAL EXPERIENCE AND LESSONS FOR VIETNAM

The dissertation analyzes the experience of a number of representative countries and regions.

Singapore represents an integrated maritime–port authority model, notable for data-driven governance, the integration of shipping flows, ports, and MSA services within a unified data architecture, and the combination of regulation with mechanisms encouraging digitalization and information sharing.

Malaysia demonstrates the value of embedding VTS and coordination tools within the overall governance architecture of seaports, emphasizing coordination mechanisms among the State, ports, and service enterprises, as well as the need to strengthen supervision in a context involving enterprise participation and partial PPP arrangements.

Japan stands out for the standardization of procedures, operations, and training; it treats safety guidance, operational documents, and region-specific

information updates as part of service quality while placing strong emphasis on the standardization of human-resource competence.

The experience of Norway, the Netherlands, and the European Union highlights data-based governance, service standardization, regulatory impact assessment, inter-regional coordination, and cross-border maritime data-sharing platforms, thereby improving regulatory quality and supervisory effectiveness.

Several African cases reveal major risks where hydrographic-charting foundations are lacking, maintenance resources are insufficient, institutions are fragmented, and supervisory data are incomplete.

From international experience, the dissertation draws the following main lessons for Vietnam: it is necessary to clearly separate the state-management function from the service-provision function; system governance and service management must be synchronized along the cycle of promulgation – implementation – supervision; investment should be prioritized according to risk and linked to data; services must be standardized through KPIs/SLAs; financial mechanisms must ensure sustainability; and management reform can succeed only when technology, data, organizational capacity, and the quality of human resources are effectively combined.

Chapter 3
THE CURRENT STATE OF STATE MANAGEMENT OF MARITIME SAFETY ASSURANCE IN VIETNAM

3.1. OVERVIEW OF THE MARITIME SECTOR AND THE STATE-MANAGEMENT APPARATUS FOR MARITIME SAFETY ASSURANCE IN VIETNAM

3.1.1. Overview of Vietnam's maritime sector

The maritime sector is a core infrastructure component of Vietnam's marine economy, playing the role of connecting international trade and logistics. With its long coastline, location on important regional shipping routes, and a seaport system distributed from north to south, Vietnam possesses favorable conditions for developing maritime transport and maritime services. During 2015–2025, seaport infrastructure and shipping channels experienced significant development; gateway ports such as Lach Huyen and Cai Mep–Thi Vai increasingly affirmed their roles within regional and global transport networks. At the same time, cargo and container throughput at seaports continued to grow, the national fleet expanded, and initial progress was made in the digitalization of port governance.

3.1.2. The state-management apparatus for maritime safety assurance

The state-management apparatus for MSA is organized along a central-to-local axis, combined with specialized public-service providers. After the institutional merger in March 2025, the Ministry of Construction became the ministerial-level state-management body in this field; the Vietnam Maritime and Inland Waterways Administration serves as the specialized agency assisting the Ministry in organizing legal implementation; the Maritime Port Authorities act as state-management focal points in the field; and operating and service-providing units include the Vietnam Maritime Safety Corporation, the coastal communication system, and the Vietnam Maritime Search and Rescue Coordination Center.

The current apparatus has the advantage of relatively high specialization and continuity in service provision; however, it also places considerable demands on process standardization, inter-agency coordination, data governance, and the clarification of accountability.

3.2. ANALYSIS OF THE CURRENT STATE OF STATE MANAGEMENT OF MARITIME SAFETY ASSURANCE IN VIETNAM DURING 2015–2025

3.2.1. Current state of the organization and management of the MSA system

3.2.1.1. Promulgation of legal documents, planning, and standards for the MSA system

The period 2015–2025 recorded significant efforts to improve the legal framework, planning system, and technical standards for the MSA system. Numerous decrees, circulars, and decisions were promulgated or amended to

regulate the life-cycle management of maritime infrastructure assets, maintenance of works, maintenance dredging of shipping channels, aids to navigation, seaport waters, and the organization of the management apparatus. Overall planning for the seaport system and detailed planning for seaport land and water areas were gradually improved, thereby creating a long-term development framework for maritime safety infrastructure.

The system of national technical regulations and standards for lighthouses, aids to navigation, shipping channels, ships, and other technical components was also updated, contributing to greater compatibility with international standards. However, documents remain overlapping and fragmented, the updating of norms and standards is still delayed, regulatory impact assessment and data-interoperability mechanisms in planning and system management have not been fully implemented, and emerging areas such as data governance, KPI/SLA frameworks, cybersecurity, and infrastructure life-cycle governance still lack a sufficiently strong legal corridor.

3.2.1.2. Implementation of management and operation of the MSA system

The implementation of management of the MSA system has undergone many changes in a more modern direction. The systems of lighthouses, aids to navigation, public shipping channels, AIS, and VTS have been expanded; the technical condition and readiness of many system components have been maintained at high levels. Infrastructure development investment has been promoted along major shipping routes, in key port areas, and in strategically important sea areas. Many investment, maintenance, and equipment-procurement projects serving maritime safety assurance have been implemented with an increasingly clear orientation toward risk prioritization and investment efficiency.

At the same time, the digitalization of asset management and operational management has gradually been implemented; data on ship registration, technical inspection, and certain data on aids to navigation, shipping channels, and traffic coordination have been managed in digital environments. Training and capacity building for both technical and managerial human resources have also been strengthened.

Nevertheless, implementation still faces major limitations. Resources for the maintenance of public infrastructure have not met actual needs; the degree of socialization in upkeep and maintenance remains limited; sectoral data are not yet fully interoperable; asset management has not yet truly followed a life-cycle approach; part of the workforce has not met the requirements of digital governance, data analytics, and new technologies; and digital transformation has still been stronger in administrative procedures than in the layer of technical operation and real-time coordination.

3.2.1.3. Inspection, supervision, and evaluation of the MSA system

Inspection, examination, and supervision activities relating to the MSA system were maintained more regularly during the study period. The frequency of specialized inspection and control increased; some technologies such as AIS, voyage-monitoring cameras, and digital data began to be used in the management of maintenance dredging and in monitoring system conditions. The number of maritime accidents tended to decline, partly reflecting the effectiveness of safety management in general and of the MSA system in particular.

However, supervision still remains heavily procedural and has not truly shifted to a risk- and data-based model. Independent technical inspection remains limited; environmental supervision in dredging and sea dumping still reveals shortcomings; and incident investigation results have not yet been effectively integrated into the feedback loop for policy and system operation. Important technical indicators such as incident recovery time, regional readiness, and data reliability have not yet been publicly disclosed and managed uniformly as mandatory KPIs. Therefore, the system-supervision function remains a notable weakness in the overall state management of MSA.

3.2.2. Current state of the management of the provision of MSA services

3.2.2.1. Promulgation of mechanisms and policies for MSA services

The institutional framework for managing the provision of MSA services has gradually been improved in the direction of clearly classifying public-service activities, essential public-utility services, and conditional commercial services. State management agencies have promulgated regulations on business conditions, service prices, techno-economic norms, quality criteria, and training and certification requirements for several key service groups such as pilotage, coastal communication, public-utility aids to navigation, and shipping-channel dredging.

These regulations have contributed to creating legal order for the service market, gradually standardizing provider inputs, and increasing accountability in the provision of public services. However, service regulation still tends to focus on input control; the service catalog, output-quality standards, and KPI/SLA system have not yet been designed in a synchronized manner; result-based pricing and ordering mechanisms remain incomplete; and the domestication of new requirements relating to data, digital transformation, and modern service-human-resource capacity has been slow.

3.2.2.2. Implementation and management of the provision of MSA services

During 2015–2025, the mechanism for providing public-utility services gradually shifted from administrative task assignment to ordering, tendering, or task

assignment under the new legal framework. This has helped increase transparency and initially promote a contract-based governance logic.

Several key services—such as maritime pilotage, coastal communication, navigational notices, dredging of public shipping channels, and search and rescue—continued to be maintained relatively stably, thereby helping to ensure safe and smooth maritime operations. Pilotage services recovered and grew in line with increased activity at seaports and within the fleet; coastal communication and navigational notices continued to be ensured on a 24/7 basis; and surveying, maintenance, dredging, and incident response continued despite considerable resource pressures.

However, the implementation of service-provision management still reveals many bottlenecks. Provider selection procedures remain prolonged; public-utility contracts are not yet tightly linked to output indicators; the service market remains insufficiently competitive; the separation between state management and service provision is not yet fully realized in all stages; mechanisms for operational data governance and interoperability among actors remain weak; and digital transformation has so far produced its strongest effects mainly in administrative procedures rather than becoming an integrated operational platform for the entire service supply chain.

3.2.2.3. Inspection and supervision of the quality of MSA services

The inspection and supervision of MSA service quality has improved thanks to the circular system on criteria for inspection, supervision, and quality acceptance of public-utility services and maritime information services. However, the actual situation shows that supervision still relies mainly on documents, reports, and traditional ex-post inspection; a mechanism for continuous supervision based on real-time data has not yet been established.

In many cases, administrative violations such as errors in records, logs, and reports still account for a large proportion of detected violations, whereas violations relating to technical output quality or actual service quality have not been fully identified, disclosed, and handled. Mechanisms for receiving customer feedback, rating provider credibility, and applying financial sanctions linked to KPIs/SLAs remain weak; and the participation of third parties and service users in quality evaluation is still limited. This constitutes a major bottleneck hindering improvements in regulatory effectiveness and service quality in state management of MSA.

3.3. QUANTITATIVE ASSESSMENT OF FACTORS AFFECTING THE OUTCOMES OF STATE MANAGEMENT OF MARITIME SAFETY ASSURANCE IN VIETNAM

Based on the 2×3 analytical framework, the dissertation employs a multiple linear regression model with standardized beta coefficients to test the effects of the six independent variables, namely H1, H2, H3, D1, D2, and D3, on the dependent variable Y, which represents the outcomes of state management in maritime safety assurance.

The quantitative dataset was derived from 250 valid survey responses. After testing the reliability of the measurement scales and standardizing the composite variables, the dissertation estimated the multiple linear regression model using Python. The findings indicate that the model explains 77.6% of the variation in the outcomes of state management in maritime safety assurance.

Among the dimensions, the quality of implementation in system management (H2) has the strongest effect on management outcomes. It is followed by the quality of promulgation in system management (H1), the quality of implementation in service-provision management (D2), and the quality of service supervision (D3). By contrast, the quality of system supervision (H3) and the quality of service promulgation (D1) do not show clear statistical significance in the overall model.

These findings confirm that the effectiveness of state management of MSA in Vietnam currently depends primarily on the quality of implementation and the quality of institutions in system management, whereas system supervision and the improvement of service policy remain weak links requiring priority attention.

3.4. OVERALL ASSESSMENT OF THE CURRENT STATE OF STATE MANAGEMENT OF MARITIME SAFETY ASSURANCE IN VIETNAM, 2015–2025

3.4.1. Achievements

In terms of the organization and management of the MSA system, the legal framework and technical standards have gradually been improved; planning for the seaport system and maritime safety infrastructure has become clearer; the management apparatus and operating units have been consolidated; the technical readiness of many system components has been maintained at high levels; progress has been made in infrastructure investment, technological application, data digitalization, and operational efficiency; inspection and examination have been strengthened; and maritime accidents have tended to decline.

In terms of managing the provision of MSA services, service institutions have gradually been standardized; pricing mechanisms, business conditions, training, and certification have been progressively improved; mechanisms for ordering, tendering, or assigning public-utility services have been expanded; the quality of several core services such as pilotage, maritime information, and search and rescue has continued to be maintained; and an initial mindset of public-service management based on outputs and data has taken shape.

3.4.2. Limitations

Regarding the system, the legal framework remains overlapping and fragmented; many regulations have not been updated in a timely manner to meet new requirements of digital transformation, data governance, cybersecurity, and infrastructure life-cycle management; maintenance resources remain insufficient; infrastructure and technology in some components remain outdated; data and digital supervision are not yet synchronized; and supervision is still heavily procedural rather than risk-based.

Regarding services, pricing and financial mechanisms do not yet fully reflect service output quality and risk; the service market remains insufficiently competitive; public contract management is not yet truly effective; service-quality supervision remains formalistic; mechanisms for user feedback, provider ranking, and KPI/SLA application are not strong enough; and service data are not yet fully interoperable.

3.4.3. Causes of limitations

The main objective causes include the inter-sectoral, multi-actor, and highly internationalized nature of the maritime field; the rapid pace of technological change and evolving international standards; shortages of financial resources, human resources, and data platforms; and the major demands of modernization under still-limited implementation conditions.

The subjective causes include institutional inertia; fragmented interests; limited capacity in policy making, regulatory impact assessment, and inter-agency coordination; an organizational apparatus and operational processes that have not been standardized commensurately with requirements; weak capacity in contract management, tendering, and data management; a management method still heavily dependent on documents and administrative procedures; and innovation incentives and accountability that have not yet been fully brought into play.

Chapter 4
SOLUTIONS FOR IMPROVING STATE MANAGEMENT OF MARITIME SAFETY ASSURANCE IN VIETNAM

4.1. NEW CONTEXT, VIEWPOINTS, AND OBJECTIVES FOR IMPROVING STATE MANAGEMENT OF MARITIME SAFETY ASSURANCE IN VIETNAM

4.1.1. New context and the need for reform

In the new period, Vietnam's state management of MSA is strongly affected by geopolitical volatility, supply-chain disruptions, the greening of maritime transport, the requirements of digital transformation, the development of e-navigation, MASS, digital data, and cybersecurity. At the same time, it is shaped by major Party and State orientations on the sustainable development of the marine economy, science and technology, innovation, digital transformation, the reorganization of the management apparatus, and decentralization and delegation of authority.

This context requires a transition from an administrative management model heavily focused on procedures to a modern governance model based on international standards, data, risk, output quality, and accountability.

4.1.2. Guiding viewpoints for improvement

First, it is necessary to ensure the Party's leadership, the State's unified management, and the promotion of controlled socialization in the field of MSA.

Second, the protection of human life and the marine environment must be treated as the highest priority in all management decisions.

Third, management must shift decisively from input control to results-based governance, data-driven governance, and risk governance.

Fourth, international integration must be pursued proactively, with coherent domestication of international treaties and standards and active participation in the formation of new standards.

Fifth, decentralization and delegation of authority must be implemented clearly and linked to strict accountability among the Ministry of Construction, the Vietnam Maritime and Inland Waterways Administration, the Maritime Port Authorities, and service-providing units.

4.1.3. Objectives and orientations

On the basis of the research findings, the dissertation proposes the following specific objectives through 2030: a strong reduction in maritime accidents and casualties; raising the readiness of aids to navigation and VTS in key areas to at least 99.8%; ensuring that 100% of Class I ports and key shipping routes have service-management and supervision mechanisms based on KPIs/SLAs; ensuring that 100% of important navigational notices are issued in a timely manner; extending AIS/VTS supervision across all key shipping routes; and completing mechanisms for training

and competency assessment of human resources in accordance with international standards. These objectives are proposed by the dissertation as orientations to support policy improvement and implementation organization.

4.2. SOLUTIONS FOR IMPROVING STATE MANAGEMENT OF MARITIME SAFETY ASSURANCE IN VIETNAM THROUGH 2030, WITH AN ORIENTATION TO 2045

4.2.1. Group of solutions for improving the organization and management of the MSA system

4.2.1.1. Improving institutional and legal mechanisms for the organization and management of the MSA system

It is necessary to comprehensively review, standardize, and systematize legal normative documents, technical procedures, techno-economic norms, standards, and regulations related to the MSA system, giving priority to resolving overlaps, inconsistencies, and responsibility gaps caused by changes in management focal points and by new requirements relating to digital transformation, data, cybersecurity, and risk governance.

It is also necessary to develop and promulgate a unified governance framework for the MSA system that clarifies the system's components according to asset life-cycle logic, clearly distinguishes state management, public-service provision, and production–business activities, and standardizes procedures for incident coordination, the publication of maritime safety information, and the control of changes in the status of aids to navigation and shipping channels.

At the same time, system data governance should be standardized, including a minimum data catalog, format standards, metadata, update responsibilities, update frequency, data-quality control, and mechanisms for interoperable sharing among actors within the system.

4.2.1.2. Improving the implementation of management and operation of the MSA system

The core solution is to standardize asset life-cycle governance for all components of the MSA system, from planning, investment, operation, maintenance, and replacement to liquidation. Unified command should be organized along the chain of "command flow – data flow – accountability flow" among management agencies, operating units, and forces ensuring security and safety.

A digitalized system-monitoring center should be established to integrate the status of aids to navigation, maintenance schedules, incident warnings, channel data, navigational-notice data, and field feedback. At the same time, hydrographic surveying and channel-data quality management must be strengthened, predictive maintenance should be applied to key equipment, and medium-term financial mechanisms for upkeep and maintenance must be ensured.

Alongside this, the capacity of technical and managerial staff should be enhanced through training and retraining in data, digital technology, project management, cybersecurity, and international standards, thereby forming teams of "smart investors" and "data-based system managers."

4.2.1.3. Improving and enhancing the effectiveness of inspection and supervision of the MSA system

A KPI framework for system supervision should be established, including indicators on readiness, downtime, recovery time, maintenance compliance, repeated incidents, channel-data quality, and the quality of maritime safety-information publication.

Digital supervision should be applied through electronic logs, digital dashboards, automatic alerts, and data-reconciliation mechanisms among the Maritime Port Authorities, operating units, and specialized management agencies; at the same time, inspection and examination should shift strongly toward a risk-based approach, focusing on high-traffic areas, complex waters, and locations with a history of incidents.

Another important requirement is the integration of accident and incident investigation data and search-and-rescue activities into the national maritime safety monitoring system in order to create a policy–technical feedback loop; at the same time, selected supervision indicators by waters or port clusters should be publicly disclosed to increase transparency and social oversight.

4.2.2. Group of solutions for improving the management of the provision of MSA services

4.2.2.1. Improving the institutional framework for managing the provision of MSA services

It is necessary to improve the system of documents governing MSA services in the direction of clearly defining the boundaries among public non-business services, essential public-utility services, and services operated under regulated market-pricing mechanisms; at the same time, the service catalog, technical standards, quality standards, and minimum output indicators for each service type must be standardized.

Pricing, unit-price, and budgeting mechanisms should shift from the logic of "input-based spending" to "output-based ordering"; for public-utility services, payment must be linked to implementation results and output quality; for market services, regulation must be sufficiently strong to control natural-monopoly risks, protect the public interest, and create incentives for quality improvement.

This should be accompanied by the promulgation of service data-governance standards specifying mandatory data to be collected, connectivity standards, sharing standards, update responsibilities, and the use of data as a basis for ex-post inspection, supervision, and payment.

4.2.2.2. Improving the implementation of management of the provision of MSA services

A service-provision management mechanism should be designed in the direction of a unified service supply chain, in which the Ministry of Construction is responsible for policy promulgation and accountability to the Government; the Vietnam Maritime and Inland Waterways Administration acts as the specialized coordinating agency; the Maritime Port Authorities serve as field-level focal points; and service providers perform under contracts or orders linked to KPIs/SLAs.

The key solution is to clearly separate the state-management function from the service-provision function in order to prevent conflicts of interest; to standardize coordination procedures among the Maritime Port Authorities, pilotage, aids to navigation, coastal communication, VTS, and related forces; and to organize a "one-stop data" mechanism in key port areas and waters to reduce overlap, shorten processing time, and improve the effectiveness of field coordination.

At the same time, public-service contracts should be renewed in the direction of integrating KPIs/SLAs, establishing clear reward-and-penalty mechanisms, linking financial responsibility to service quality, and strongly applying digital technology in dispatch management, reporting, data traceability, and contract management.

4.2.2.3. Building a continuous MSA service-quality monitoring system based on real data and risk

A minimum KPI/SLA framework should be promulgated for key service groups, while continuous supervision should be organized through dashboards, real-time data, reconciliation mechanisms, user feedback, and early-warning tools.

There should be a shift from "heavy pre-inspection" to "smart post-inspection," in which digital data, user feedback, independent evaluation results, and operational evidence become the principal bases for acceptance, payment, provider ranking, and the application of financial or administrative sanctions.

In addition, mechanisms for receiving and handling feedback from enterprises and service users must be improved; a credibility-rating system should be developed; and selected service-quality supervision results by waters or port clusters should be publicly disclosed, thereby promoting fair competition and improving public-service quality.

4.3. RECOMMENDATIONS

4.3.1. Recommendations to the National Assembly

It is necessary to promptly study, draft, and promulgate a new Maritime Code to replace the 2015 Vietnam Maritime Code, with full supplementation of provisions on infrastructure life-cycle management, data governance, KPIs/SLAs, sustainable financial mechanisms, maritime cybersecurity, and new MSA services; at the same time, thematic oversight of maritime safety and the quality of MSA public-utility services should be strengthened.

4.3.2. Recommendations to the Government

A national inter-sectoral coordination mechanism for maritime safety should be established; a clear framework of coordination and decentralization among ministries, sectors, localities, and enforcement forces should be promulgated; a program on digital transformation and cybersecurity in the maritime sector should be developed; medium-term financial mechanisms and results-based budgets for MSA infrastructure and services should be ensured; and necessary decrees should be issued promptly while awaiting legal amendment.

4.3.3. Recommendations to related agencies and organizations

Ministries, sectors, localities, specialized agencies, service-providing enterprises, and training institutions need to coordinate closely in standardizing data, building sustainable financial mechanisms, enhancing human-resource capacity, developing digital infrastructure, establishing incident-response procedures, sharing information, complying with KPIs/SLAs, and fully participating in the monitoring and evaluation system for the quality of MSA services.

CONCLUSION

The dissertation has systematized the theoretical foundations, international experience, and Vietnamese practice in order to build an integrated 2×3 analytical framework for state management of maritime safety assurance, in which the two management contents—system management and service-provision management—are examined through three functions: promulgation, implementation, and supervision/evaluation. On that basis, the dissertation analyzes the current state of state management of MSA in Vietnam during 2015–2025, clarifying achievements, limitations, and the causes of those limitations.

The research results show that the quality of implementation in system management and the quality of promulgation in system management are the factors exerting the strongest effects on state-management outcomes, followed by the quality of implementation and supervision in service-provision management. On the basis of these findings, the dissertation proposes two major groups of solutions: improving the organization and management of the MSA system and improving the management of the provision of MSA services, while also making recommendations to the National Assembly, the Government, and relevant agencies in order to enhance the effectiveness and efficiency of state management in this field.

The dissertation still has some limitations: it has not yet been able to exploit national real-time operational data; nor has it gone deeply into separate themes such as autonomous ships, green shipping, climate change, cybersecurity, and certain new MSA services. These are also directions for future research that should continue to be pursued in order to test the indicator system more deeply, assess the socio-economic impacts of the proposed solutions, and further improve the model of state management of MSA in the context of digital transformation and international integration.

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