

Fragmentation, Capacity, and Coherence: Rethinking Maritime Governance in Small Coastal States

A. Kaldma & L. Timberg

Estonian Maritime Academy of Tallinn University of Technology, Tallinn, Estonia

ABSTRACT: Maritime governance in European seas is characterised by increasing regulatory complexity and institutional fragmentation. While previous research has highlighted the challenges of coordination, the impact of fragmentation on the inspection, surveillance and enforcement systems through which maritime governance is implemented, has received less attention. This article examines how institutional fragmentation affects maritime governance capacity through the organisation of inspection and surveillance systems in Estonia. Using a qualitative case study of Estonia, it combines qualitative document analysis with structured institutional mapping. The analysis applies a coding framework based on coverage, overlap, gap, and update lag. The analysis shows that Estonia's maritime governance system is characterised by fragmented institutional responsibilities, overlapping inspection functions and an update lag in which new regulatory requirements are not systematically reflected in institutional mandates. Although most regulatory obligations are formally assigned, fragmented responsibilities lead to overlaps, coordination gaps, and inconsistencies in inspection and surveillance systems. The article contributes to maritime governance research by demonstrating how institutional fragmentation affects operational governance capacity, and by identifying the lack of systematic updating of mandates as a structural source of governance fragmentation. The findings suggest that improving maritime governance requires formal mechanisms for coordinating institutional responsibilities and systematically updating mandates in response to evolving regulatory requirements.

1 INTRODUCTION

Maritime governance is becoming increasingly complex. European coastal states must manage several interrelated policy areas, including shipping, environmental protection, maritime safety, fisheries, and the development of the blue economy. These responsibilities are distributed across different institutions and regulatory frameworks, creating governance systems that operate across local, national, regional and international levels that may overlap or conflict [3]. Such multi-level governance appears to be a defining feature of the European seas examined in this article, where decision-making involves

interactions between states, regional organisations, and international bodies [8, 14]. While such arrangements reflect the diversity of maritime activities, they require effective coordination to function as a coherent system. This remains a persistent challenge. This complexity is particularly evident in the Baltic Sea region, where environmental governance, economic activities, and international regulatory obligations intersect, resulting in fragmented institutional arrangements and persistent coordination challenges [16, 17].

Previous research has focused on how maritime governance should be organised to address these

coordination challenges. Approaches such as ecosystem-based management and blue economy governance emphasise cross-sectoral integration and alignment between stakeholders and policy objectives [4, 15]. At the same time, studies highlight the need to balance the competing goals of sustainability, economic development, and security [1, 5, 9]. These approaches provide normative models for integrated governance but largely assume that institutional structures can coordinate responsibilities and implement policies effectively.

In practice, maritime governance systems often fall short of these expectations. Rather than operating as integrated systems, responsibilities are spread across separate institutions and legal frameworks, leading to fragmented governance arrangements. Research has shown that overlapping mandates, unclear responsibilities, and weak coordination mechanisms create challenges for policy coherence and implementation [3, 17]. Policy capacity studies also show that fragmentation limits the ability of institutions to coordinate actions and respond to regulatory demands [11, 18]. Studies on barriers to sustainable blue economy development identify weak coordination, institutional inefficiencies, and capacity constraints as key challenges [7], while research on knowledge integration emphasises the difficulties of aligning diverse actors and information systems in fragmented governance contexts [12]. In addition, recent work highlights a gap between regulatory design and implementation, particularly in the context of enforcement and operational coordination [10].

Despite these findings, the existing literature has paid limited attention to how institutional fragmentation affects the operational dimension of maritime governance. Maritime governance is implemented through systems of inspection, monitoring, and surveillance, that translate regulatory requirements into practice. These functions are typically spread across several public authorities, but their organisation and coordination remain under-researched. As a result, it is unclear how fragmented governance systems affect enforcement outcomes.

This gap is particularly relevant in small coastal states, where administrative capacity is limited and coordination challenges may have greater impact. Evidence from Estonia suggests that maritime governance responsibilities are dispersed among several institutions under sector-specific legislation including the Transport Administration Statute, the Environmental Board Statute, the Maritime Safety Act, the Police and Border Guard Act, the Ports Act, the Water Act and related legislation. Existing coordination mechanisms are insufficient to ensure coherent implementation [6], and the impact of such fragmentation on inspection and surveillance systems has not been systematically analysed.

This article addresses this gap by examining how institutional fragmentation affects maritime governance capacity through the organisation of inspection and surveillance systems. It focuses on Estonia as a case study, while contributing to broader understanding of governance challenges across European seas.

This article contributes to maritime governance research by demonstrating how institutional

fragmentation shapes the operational capacity of inspection and surveillance systems and by linking governance structures to enforcement outcomes in the context of a small coastal state.

The significance of this study lies in linking institutional structures to operational governance outcomes. Based on this analysis, the article makes two main claims. First, institutional fragmentation weakens governance capacity by creating inconsistencies in inspection and surveillance responsibilities. Second, improving governance requires a systematic mechanism for allocating and updating institutional responsibilities in response to regulatory changes. This means moving from static governance structures to a more adaptive and integrated system.

The following sections describe the methodological approach used to map institutional responsibilities and regulatory obligations, followed by analysis of how inspection, surveillance, and reporting functions are distributed across Estonian governance institutions. The article then examines the resulting fragmentation patterns and their implications for governance capacity, coordination, and implementation of maritime regulatory requirements.

2 METHODS

This study applies a qualitative case study design [19] to analyse how institutional fragmentation affects maritime governance capacity in Estonia. The approach is appropriate because maritime governance responsibilities are defined in legal and administrative documents, allowing for the tracing of institutional mandates and their alignment with regulatory requirements.

Data collection is based on three sources. First, national legislation was analysed to identify the responsibilities assigned to public authorities in maritime governance. These include sectoral laws covering transport, environmental protection, fisheries, border control, marine safety, cultural heritage, and port governance. Second, European Union legislation and international maritime conventions were reviewed to identify regulatory requirements related to inspection, monitoring, and enforcement. Third, institutional mapping data was compiled to link regulatory requirements with assigned responsibilities across authorities. Data sources are described in Table 1. The complete corpus of legal and policy sources used for institutional mapping is listed under Legal and Policy Sources.

Table 1. Data sources analysed to identify institutional responsibilities and legal obligations in the Estonia's maritime governance system

Source	Number analysed	Analytical purpose
Estonian legislation	26	Institutional mandates
Institutional statutes	11	Authority responsibilities
EU legislation	8	Legal obligations
International conventions	14	Inspection and reporting requirements
TOTAL documentary sources	59	

Estonia was selected as a representative small coastal state with extensive maritime responsibilities

but limited administrative capacity. Maritime governance functions are spread across several ministries and agencies, making Estonia a suitable case for examining how institutional fragmentation affects governance capacity. The sample includes all Estonian public authorities with formally defined maritime-related responsibilities. Institutions were identified through statutory mandates, ensuring coverage of all major governance areas, including maritime transport, environmental protection, fisheries, border management, ports, cultural heritage protection, and maritime safety.

Data analysis was conducted using qualitative document analysis [2] and a structured coding procedure. The analysis consisted of four steps. First, regulatory requirements related to inspection, monitoring, surveillance, reporting, and enforcement were identified from EU legislation and international conventions. Second, statutory responsibilities were extracted from Estonian legal acts and assigned to the relevant institutions. Third, regulatory legal requirements were matched with institutional responsibilities. Finally, each function was coded according to four criteria: coverage (a responsibility is assigned), overlap (more than one institution is responsible), gap (no institution is clearly responsible), and update lag (new regulatory legal requirements are not reflected in institutional mandates). These criteria were used to assess the extent of institutional fragmentation and its implications for governance capacity.

Coding was done by comparing each regulatory legal obligation with the statutory mandates of the responsible institutions. Where a single institution had a clearly defined mandate the function was coded as coverage; where several institutions shared comparable responsibilities it was coded as overlap; where there was no explicit mandate, it was coded as a gap; and where regulatory legal obligations had evolved without corresponding changes in institutional mandates it was coded as update lag. Figure 1 summarises the analytical framework and coding procedure.

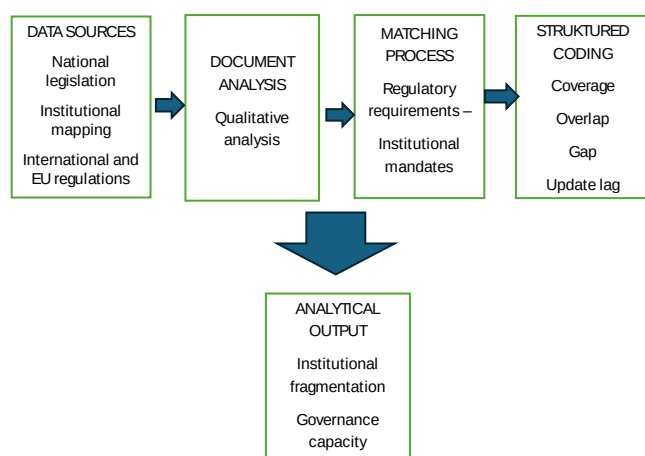


Figure 1. Analytical framework linking data sources, document analysis, and structured coding to assess institutional fragmentation and governance capacity.

The method is justified by its ability to directly link legal responsibilities to regulatory requirements and operational functions. Unlike approaches that focus on

stakeholder perceptions or policy outcomes, this method examines the formal structure through which governance is implemented. This allows fragmentation to be identified as a structural condition rather than a descriptive observation.

The analytical process is reproducible because it is based on publicly available legal acts, institutional statutes, and regulatory documents. Researchers can replicate the study by identifying relevant institutions, extracting their statutory responsibilities, matching these responsibilities to legal requirements, and applying the same coding framework for coverage, overlap, gaps, and update lags. The approach also enables systematic comparison of different maritime governance systems.

3 RESULTS

The results show that Estonia's maritime governance system is characterised by institutional fragmentation, overlapping enforcement responsibilities, and persistent update lag. While most regulatory functions are formally assigned, responsibilities are dispersed across several authorities and are not systematically adjusted to evolving international and European requirements. These structural features create coordination challenges and reduce governance capacity in inspection, monitoring, and surveillance systems.

3.1 Institutional structure of maritime governance

The institutional mapping shows that Estonia's maritime governance system lacks a central coordinating authority and is characterised by a fragmented distribution of responsibilities across sector-specific institutions. These include institutions responsible for maritime safety, environmental protection, border control, fisheries, and port governance. The institutional mapping, based on statutory provisions, confirms that no single authority holds comprehensive responsibility for maritime governance. Instead, responsibilities are allocated independently across policy areas, resulting in a dispersed governance structure. This finding reflects broader observations in the maritime governance literature, that describe governance systems as inherently multi-level and institutionally distributed [1, 14].

The mapping process reveals that fragmentation is embedded in the formal structure of governance rather than emerging only at the implementation stage. The institutional distribution of responsibilities and their relationship to regulatory obligations is illustrated in Figure 2. For example, environmental protection functions are divided between environmental authorities and operational actors such as the Defence Forces, while port-related inspection responsibilities involve both transportation and environmental institutions.

3.2 Inspection and surveillance system

The analysis shows that fragmentation becomes more pronounced at the operational level, where inspection,

monitoring, and surveillance functions are spread across several institutions. Responsibilities overlap and are sometimes incomplete, while institutions operate within their own statutory frameworks. The structured coding of these functions using the criteria of coverage, overlap, gap, and update lag reveals significant inconsistencies in how regulatory requirements are implemented.

International conventions and EU regulations were analysed to identify operational governance obligations, which were then matched with the responsibilities assigned to Estonian ministries, agencies, and operational actors through their statutes and sector-specific legislation. Figure 2 illustrates the institutional distribution of these functions, while Table 2 summarises the coded results for representative governance functions.

Structural Overlaps and Fragmentation in Maritime Governance

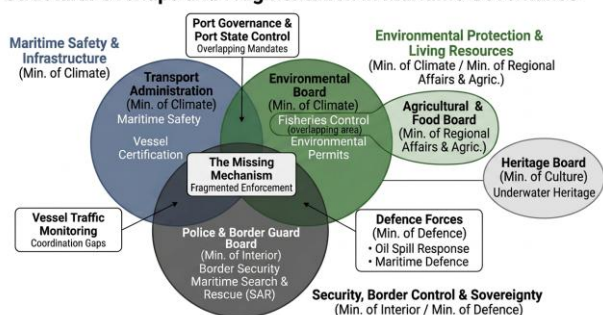


Figure 2. Institutional allocation of monitoring, inspection, surveillance, reporting and enforcement responsibilities across Estonia's maritime governance system

The figure illustrates how regulatory obligations arising from international and European frameworks are translated into operational governance functions and distributed among several Estonian authorities. It shows that responsibilities for monitoring, inspection, surveillance, and reporting are allocated through separate sector-specific governance structures rather than through an integrated system. By linking regulatory obligations with responsible institutions, the figure visualises the fragmented nature of maritime governance and highlights the lack of a central coordination and updating mechanism capable of systematically aligning institutional mandates with evolving regulatory requirements. The resulting overlap, parallel monitoring systems, coordination gaps, and update lag represent the core governance effects identified in the analysis.

Table 2. Examples of regulatory obligations, institutional allocation, and fragmentation patterns in Estonia's maritime governance system

Function	Regulatory requirement	Responsible institution(s)	Finding
Port State Control inspections	Directive 2009/16/EC	Transport Administration	Coverage
Maritime safety inspections	Maritime Safety Act; SOLAS obligations	Transport Administration	Coverage
Port reception facilities and ship waste management	Directive (EU) 2019/883	Transport Administration, Environmental Board	Overlap
Marine environmental monitoring	Marine Strategy Framework Directive (2008/56/EC);	Environmental Board, Ministry of Climate, Defence Forces (selected	Overlap

Oil pollution surveillance and response	Environmental Monitoring Act MARPOL; Environmental Liability Directive; Water Act	monitoring activities) Environmental Board, Police and Border Guard Board, Defence Forces	Overlap
Fisheries monitoring and control	Common Fisheries Policy obligations; Fishing Act	Environmental Board, Agriculture and Food Board, Police and Border Guard Board	Overlap
Border surveillance in maritime areas	Schengen obligations; Police and Border Guard Act	Police and Border Coverage Guard Board	
Underwater cultural heritage protection	UNESCO Convention on the Protection of Underwater Cultural Heritage; Heritage Conservation Act	National Heritage Board, Environmental Board	Overlap
Wreck removal and hazard reporting	Nairobi Wreck Removal Convention	Transport Administration, Environmental Board	Overlap
Offshore environmental risk monitoring	Directive 2013/30/EU	Environmental Board, Transport Administration	Overlap
Marine biodiversity monitoring	Convention on Biological Diversity; Nature Conservation Act	Environmental Board	Coverage
Cross-sector maritime risk assessment	Multiple EU and IMO instruments	No clearly designated coordinating authority	Gap
System-wide review of new maritime regulatory obligations	Multiple EU regulations and international conventions	No formally assigned institution	Gap
Mapping of institutional responsibility coverage across maritime sectors	Multiple EU and IMO instruments	No formally assigned institution	Gap
Coordination of inspection planning across maritime authorities	Multiple sectoral regulations	No formally assigned institution	Gap
Integration of monitoring and surveillance data across authorities	Multiple reporting obligations	Partial responsibilities distributed across authorities	Gap / Overlap
Assignment of responsibilities following introduction of new EU maritime regulations	Emerging regulatory requirements	Responsibilities updated ad hoc by sector	Update lag
Incorporation of new international reporting obligations into institutional mandates	IMO and environmental conventions	No systematic review mechanism	Update lag
Alignment of institutional statutes with evolving	All maritime governance sectors	Institution-specific amendments only	Update lag

regulatory obligations			
Updating surveillance responsibilities when new monitoring technologies become mandatory	Emerging EU digital reporting requirements	No coordinated updating process	Update lag

The coding results show a clear pattern. Core sector-specific inspection and surveillance functions are generally assigned to responsible authorities, whereas cross-sector coordination functions are characterised by institutional gaps. Environmental monitoring and pollution response often involve overlapping institutional responsibilities, while mechanisms for reviewing and updating institutional mandates are largely absent. These patterns correspond to the four coding categories used in the analysis and demonstrate that fragmentation extends beyond institutional design into operational governance.

3.3 Regulatory alignment and update lag

A key finding of this study is the existence of an “update lag” between regulatory developments and institutional responsibilities. Analysis of EU and international regulations shows that new inspection and monitoring requirements are constantly being introduced. However, the corresponding institutional mandates are not systematically updated to reflect these changes.

In several cases, regulatory requirements are only partially implemented or not clearly assigned to any institution. This creates a mismatch between regulatory obligations and governance structures. The lack of a formal mechanism for reviewing and updating institutional responsibilities leads to uneven implementation across sectors. The coding analysis also shows that the update lag is most evident where new cross-sectoral coordination, reporting, and surveillance requirements have emerged without corresponding institutional adaptation.

4 DISCUSSION

The discussion considers the implications of the findings for maritime governance theory and practice. It examines how institutional fragmentation affects governance capacity, discusses update lag as a structural feature of fragmented governance, considers the relevance of the findings for small coastal states, and reflects on the strengths and limitations of the study.

The results show that institutional fragmentation has a measurable impact on governance capacity. Although most operational functions are formally assigned to public authorities, fragmented institutional arrangements generate overlaps, coordination gaps, and administrative complexities that reduce the effectiveness of inspection, monitoring, and enforcement systems. These findings support previous research highlighting the importance of coordination and clear allocation of responsibilities for effective governance [11, 18].

The institutional mapping also shows that fragmentation is embedded in statutory governance structures rather than occurring only during implementation. This finding is consistent with previous studies that describe maritime governance as inherently multi-level and institutionally distributed [3, 8, 14], while extending this literature by showing how institutional arrangements directly influence operational enforcement systems.

One of the main contributions of this study is the identification of the update lag as a structural feature of fragmented maritime governance. Existing literature has highlighted gaps between regulatory design and implementation [10], but the present analysis shows that these gaps are reinforced by the absence of systematic mechanisms for reviewing institutional mandates as regulatory obligations evolve.

Fragmentation should therefore be understood not only as a static distribution of responsibilities but also as a dynamic governance process. As international and European regulatory requirements continue to expand, governance systems that lack formal updating mechanisms become progressively less and less aligned with their legal obligations.

Although the empirical analysis focuses on Estonia, the identified governance mechanisms are relevant for other small coastal states facing similar administrative capacity constraints. Sector-specific governance structures may adequately support individual policy areas while simultaneously creating coordination problems within the broader maritime governance system. The analytical framework developed in this study therefore provides a basis for examining institutional fragmentation in comparable governance contexts.

The findings also suggest that improving maritime governance does not necessarily require the creation of new institutions. Instead, governance capacity can be strengthened through formal mechanisms that periodically review regulatory developments, assign new responsibilities, and coordinate institutional mandates across sectors.

This study focuses on formal institutional arrangements as defined by legislation and statutory mandates. This approach provides a systematic and reproducible basis for analysing institutional fragmentation and comparing governance structures across jurisdictions. However, it does not capture informal coordination practices or variations in operational implementation.

Future research should combine institutional mapping with interviews, organisational analysis, or comparative case studies to examine how formal governance structures interact with administrative practices and enforcement outcomes in different maritime governance systems.

5 CONCLUSION

This article examines how institutional fragmentation affects maritime governance capacity through the organisation of inspection and surveillance systems. The results show that maritime governance in Estonia

is structurally fragmented, with responsibilities divided among several institutions whose mandates are defined in separate statutory frameworks. The analysis also shows that this fragmentation is most evident at the operational level, where inspection and surveillance functions show overlaps, gaps, and weak coordination. A key result is the identification of an “update lag,” whereby new regulatory requirements are not systematically incorporated into institutional mandates, leading to a mismatch between regulatory obligations and governance structures.

The article contributes to the field by linking institutional fragmentation to operational enforcement systems, thereby extending existing research on maritime governance. Previous studies have similarly identified fragmentation, coordination challenges, and gaps between regulatory design and implementation [3, 10], but they primarily focus on legal frameworks or policy-level dynamics. In contrast, this article shows that fragmentation is embedded in the statutory allocation of responsibilities and becomes operationally significant through inspection and surveillance systems. These differences arise from the methodological focus on institutional mapping and structured coding of responsibilities, rather than stakeholder perceptions or policy analysis. As a result, the article advances the literature by providing a systematic framework for analysing how governance structures translate into enforcement outcomes and by identifying the absence of institutional updating mechanisms as a key driver of fragmentation.

The significance of this work lies in demonstrating that improving maritime governance requires not only better policy design but also the development of mechanisms to ensure that institutional responsibilities are continuously aligned with evolving regulatory requirements.

The analysis assumes that formal statutory responsibilities accurately reflect the allocation of governance functions and that legal documents provide a reliable basis for identifying institutional roles. At the same time, the study is limited by its focus on formal structures, which may not fully capture informal coordination practices or variations in implementation across contexts. Future research should extend this approach to comparative analyses of European maritime governance systems in order to examine how institutional updating mechanisms can be designed and implemented more effectively.

The analysis focuses on formal institutional responsibilities defined in legislation and statutory mandates and does not assess how coordination functions in everyday administrative practice or operational decision-making. The study also does not quantitatively evaluate the effectiveness of individual authorities or enforcement outcomes but rather examines how governance structures allocate and organise regulatory responsibilities across the system.

The analysis of statutory mandates shows that core monitoring, inspection, and reporting functions are largely covered within sector-specific legal frameworks. Environmental, maritime safety, and border surveillance obligations are assigned to appropriate authorities through existing legislation. However, these responsibilities are spread across institutions without a unified system for coordination

or integration. As a result, while individual obligations are formally addressed, there is no mechanism to ensure their comprehensive and coherent implementation across the maritime governance system.

The results show that institutional fragmentation becomes operationally visible through inspection, monitoring, and surveillance systems, where overlapping mandates and coordination gaps directly affect implementation capacity. There is no statute that assigns responsibility for mapping regulatory obligations, reviewing coverage across institutions and updating mandates as new rules emerge. Although based on the Estonian case, the mechanisms identified reflect broader governance challenges associated with fragmented maritime governance systems across European seas.

The findings suggest that improving maritime governance does not necessarily require the creation of new institutions, but rather the development of mechanisms that systematically align institutional responsibilities with evolving regulatory requirements. Rather than implementing new European Union and IMO obligations through ad hoc adjustments, governance systems should include formal procedures for reviewing new regulatory requirements, assigning responsibilities, and assessing the need for coordination between institutions. Such mechanisms could include statutory coordination requirements, inter-agency review processes, or dedicated coordination bodies responsible for ensuring comprehensive coverage of monitoring, inspection, and reporting functions. At the operational level, more integrated inspection systems could be supported by shared information systems, coordinated inspection practices, and clearer allocation of mandates, thereby reducing overlaps, gaps, and inconsistencies in enforcement. The practical priority for Estonia is to establish a permanent mechanism for coordinating and updating maritime governance responsibilities across institutions.

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