

TOWARDS SMART REGULATIONS: AN ANALYSIS OF THE EFFECTIVENESS OF INTERNATIONAL MARITIME REGULATIONS

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Introduction

This study undertakes a comprehensive exploration of maritime environmental regulations, with a dual focus on their effectiveness from the industry's perspective and their practical implementation. The study places a significant emphasis on evaluating the International Maritime Organisation (IMO) regulations' capacity to address climatic challenges within the maritime sector. The central argument posits that the regulatory frameworks governing the maritime industry are characterized by comprehensiveness and ongoing evolution. This dynamism in regulatory development and implementation frequently results in suboptimal outcomes in terms of policy goal attainment, enforcement strategies, tangible impacts, outcomes, and perceptions of fairness within the industry. A substantial portion of the IMO's initiatives is rooted in adaptive and preventive measures, encompassing various regulations targeting maritime emissions, waste management, noise pollution, among others. Beyond these measures, the IMO demonstrates a commitment to fostering a 'smart' sector that prioritizes principles of efficiency, effectiveness, and adaptability. Nevertheless, the transition towards such a 'smart' sector necessitates the development of even more astute regulatory frameworks. In essence, 'smart' regulations demand a meticulous recalibration of regulatory instruments to ensure their alignment with evolving policy directives and regulatory paradigms.

Materials and Methods

The research adopts a mixed-methods approach, integrating both quantitative and qualitative methodologies. The primary focus is on the collection, analysis, and interpretation of numerical data gathered through surveys and interviews to assess the effectiveness of existing regulations in mitigating the environmental impacts of shipping activities, particularly in the context of climate change. Data collection occurred from September 2022 to August 2023. Initially, a survey was conducted to gauge the perceptions of maritime experts regarding the impact of IMO environmental regulations. Diverse perspectives were gathered from 104 respondents, comprising maritime practitioners (N=67) and researchers (N=37) representing 11 nations: Denmark (N=11), Estonia (N=14), Finland (N=26), Germany (N=17), Norway (N=6), Poland (N=11), Sweden (N=9), and the United Kingdom (N=7), with additional participants from Latvia (N=1), Lithuania (N=1), and Nigeria (N=1). All respondents possessed specialized expertise in fields such as shipbuilding, ship operations, ports, and related sectors. Subsequently, to validate the survey findings, twenty-seven (27) structured and semi-structured expert interviews were conducted. The perceived effectiveness of the regulations was statistically assessed using dedicated software. A comprehensive analysis of the interview data was carried out to delineate the regulatory trends of the IMO, as scrutinized through the Maritime Regulatory Effectiveness Analysis Framework (MREAF) developed by the authors.

Results

The results are divided into two main sections:

1. **Maritime Regulation Implementation:** This section highlights stakeholder perspectives on the challenges of regulation implementation, their effectiveness, and potential interventions. The data reveals that 98% of respondents are well-informed about emissions and efficiency regulations, 85% are aware of waste management and maritime litter regulations, and 54% are familiar with noise management regulations. Importantly, 86.5% of stakeholders express satisfaction with the level of regulatory preparedness. Nevertheless, challenges persist, including underdeveloped infrastructure (87%) and gaps in regulatory services, such as monitoring and sanctions (77.9%). The high level of satisfaction with regulatory preparedness underscores stakeholders' confidence in the IMO's capacity to formulate effective rules.
2. **Characterization of Smart Regulation in Maritime Regulations:** This study assesses regulations against the identified attributes of smart regulation, including effectiveness and efficiency, flexible regulatory adaptation, stakeholder alignment, industry transparency, and adoption of best practices. Effectiveness and efficiency, with a p-value of 2.05%, emerge as the most statistically significant attributes. To discern which of the six attributes most significantly influence effectiveness and efficiency, a regression analysis, guided by Kalyani (2023), was employed. The R² result indicates that coefficients related to flexibility in regulatory adaptation (0.05), adaptation (0.11), stakeholder alignment (0.15), industry transparency (0.18), and adoption of best practices (0.16) were statistically significant with positive effects. These β -coefficients collectively account for approximately 72% of the variability in effectiveness and efficiency, highlighting their significance as key determinants.

Implications for Sustainable Maritime Operations

This comprehensive framework offers a holistic understanding of the intricate nature of smart regulations, facilitating a thorough examination of various facets of the regulatory landscape. Broadly, this research aims to contribute to the development of effective shipping regulations that support sustainable growth while promoting environmentally responsible and cost-effective shipping practices. By emphasizing stakeholder engagement, the findings encompass a wide range of interests and priorities, thus facilitating more balanced and informed policy recommendations. Furthermore, this research equips stakeholders with insights to navigate forthcoming challenges and capitalize on potential opportunities. Such evidence is essential for refining existing regulations, crafting new policies, and ensuring their suitability for both current and anticipated industry needs.