

Maritime Crime and Security: Pivotal Issues in a Global World

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Abstract

Maritime security in the 21st century is a pressing global concern, with multifaceted challenges ranging from piracy to environmental crimes. This article delves into the complexities of maritime crime and security, emphasizing their global implications. Contemporary maritime threats have evolved in scale and intricacy, necessitating comprehensive and adaptive responses. Underlying factors, including economic disparities, technological advancements, and maritime infrastructure vulnerabilities, contribute to these threats. The international legal framework, while foundational, faces challenges in enforcement and adaptability. Past interventions offer lessons, underscoring the importance of international cooperation and interdisciplinary approaches. Maritime crime has profound global repercussions, influencing trade, economies, and environmental sustainability. Economic ramifications include inflated insurance costs and trade disruptions, while environmental consequences threaten marine ecosystems. Addressing these challenges demands international collaboration, as maritime issues often transcend national boundaries. The article underscores the significance of maritime security in our interconnected world, advocating for continued research, international cooperation, and decisive policy actions. The future of our oceans and global security hinges on collective resolve and action.

Keywords

Contemporary maritime threats, Environmental consequences, Global maritime implications, Maritime security

1. Introduction

In today's ever-evolving global landscape, maritime security has emerged as a paramount concern, emblematic of the intricate interplay between commerce, geopolitics, and transnational threats. One of the most prominent among these threats is maritime piracy, which poses a significant risk to both commerce and security on a global scale. Despite the existence of a complex framework designed to promote international cooperation on this issue, the collective efforts in addressing maritime piracy have often been criticized for their disorganized, ad hoc nature, resulting in only minimal effectiveness (*Struett, Nance & Armstrong, 2013*). This challenge is further compounded by the fact that the objectives of states and international institutions concerning maritime security are heavily influenced by geographical and geopolitical factors, even if these links are not explicitly articulated in official documents (*Germond, 2015*).

The unique characteristics of the maritime domain serve to amplify these challenges. Maritime security is distinguished by its intrinsic interconnectedness, transnational nature, liminality—bridging both land and sea—and cross-jurisdictional complexities that manifest at both the national and institutional levels (*Bueger, Edmunds & Ryan, 2019*). This interconnectedness implies that maritime security issues frequently transcend the confines of national borders, necessitating a coordinated and collaborative approach among nations and organizations. Furthermore, the involvement of private actors in maritime security governance underscores the "globalization

paradox" – a phenomenon where the globalized security environment prompts both active and passive responses to change (Aarstad, 2017).

However, it is essential to recognize that the maritime domain isn't solely characterized by threats; it also offers profound insights into broader debates concerning governance and security within a shifting global order. The examination of maritime issues, such as piracy, can provide valuable conceptual insights into the constitutive effects of counter-piracy interventions (Jacobsen & Larsen, 2019). Moreover, maritime security has effectively redirected attention away from traditional national security concerns towards the mitigation of non-traditional security threats on a global scale (Ryan, 2019).

Given the intricacies inherent in this domain, there is an urgent imperative for a comprehensive understanding of maritime security. Addressing maritime crime and ensuring security in the maritime realm extends beyond the mere countering of threats; it necessitates a profound comprehension of the geopolitical, economic, and social dimensions underpinning these multifaceted challenges. As the world continues to grow more interconnected, the significance of maritime security in upholding global stability and prosperity cannot be overstated. It serves as a critical pillar upon which our increasingly interdependent global community relies.

2. Overview of Contemporary Maritime Threats

The maritime domain, with its vast expanses and intricate interconnectedness, has perpetually been susceptible to an array of multifaceted security threats. In recent times, the maritime security agenda has undergone a significant evolution, expanding to encompass a broad spectrum of challenges, each bearing profound implications on global, regional, and national scales. These multifarious challenges span across various dimensions, including but not limited to national security, environmental preservation, economic stability, and the protection of human lives (Bueger, Edmunds & Ryan, 2019).

Among the most salient threats within this domain, maritime piracy has resurged in certain regions, most notably in Southeast Asia. This resurgence poses a formidable threat not only to the safety and security of seafarers but also to global commerce. Maritime terrorism, leveraging inherent vulnerabilities in the maritime transport industry and the capabilities of terrorist groups with maritime prowess, has emerged as a significant menace, particularly targeting commercial ports and shipping activities within this region (Raymond, 2006).

However, the spectrum of maritime threats extends beyond piracy and terrorism. Smuggling, for instance, has remained a persistent issue, with illicit trafficking routes often exploited for the clandestine movement of weapons of mass destruction (WMD) and related materials, thereby exacerbating the global security landscape (Bateman, 2012). Furthermore, the maritime supply chain, integral to the functioning of national economies, faces an array of threats. Operational, physical, and financial risks loom large in this sector, with maritime supply chain service providers grappling with the intricate balance between cost-effectiveness, time efficiency, security, competitiveness, and the safeguarding of goods in transit (Yang, 2011).

Environmental crimes within the maritime domain, while less discussed in the security discourse, possess far-reaching consequences. Activities such as illegal dumping, oil spills, and various forms of pollution imperil fragile marine ecosystems, thereby jeopardizing the livelihoods of communities reliant on marine resources. These environmental transgressions underscore the interconnectedness of ecological and security concerns in the maritime realm.

Case studies from diverse regions further illuminate the gravity of these multifaceted threats. Consider Indonesia, a nation characterized by a vast archipelago. Here, insights into the varied understanding of maritime security among key state actors emerge. While there is a growing recognition of the need to extend security beyond traditional military threats, challenges like piracy, smuggling, and environmental crimes continue to demand attention and effective mitigation strategies (Chapsos & Malcolm, 2017).

Moreover, within the maritime domain, the software systems that underpin critical operations are not immune to vulnerabilities. This highlights the pressing necessity for robust cybersecurity measures in maritime operations to protect against potential cyber threats and safeguard the integrity of maritime infrastructure and communications (Eichenhofer et al., 2020).

2.1 International Legal Framework for Managing a Maritime Crime

The maritime domain, an expansive and intricately woven tapestry of activities, demands the establishment of a robust international legal framework to govern matters of security and crime prevention effectively. At the core of this framework stands the 1982 United Nations Convention on the Law of the Sea (UNCLOS), a pivotal document

that lays down the foundational legal principles regulating the utilization and preservation of the world's oceans. UNCLOS serves as the linchpin for delineating the rights and responsibilities of nations concerning their engagement with the world's oceans, establishing crucial guidelines that pertain to various facets, including commercial activities, environmental preservation, and the responsible management of marine natural resources (Chang, 2020).

Nevertheless, while UNCLOS provides a comprehensive framework, it is complemented by specific conventions and treaties designed to address the intricate nuances of maritime security. One such example is the International Regulations for Preventing Collisions at Sea (1972), which offers essential guidelines aimed at preventing collisions among vessels navigating the open seas (Chang, Zhang & Wang, 2020). Additionally, it is imperative to recognize that the maritime security agenda is a complex tapestry of interlinked challenges that bear global, regional, and national significance. These encompass issues spanning the realms of national security, environmental preservation, economic stability, and the safeguarding of human lives (Bueger, Edmunds & Ryan, 2019).

However, notwithstanding the existence of these legal and regulatory frameworks, considerable challenges persist in the effective enforcement of international maritime law. A primary concern lies in the fragmentation of the maritime security landscape, which can hinder the harmonious application of these regulations. While there have been efforts to create a risk-based framework for maritime security research that engages various stakeholders and fosters international cooperation, substantial work remains to be undertaken to achieve a truly cohesive approach (Helmick, 2008). Furthermore, geopolitical instability, particularly evident in regions like the Horn of Africa, underscores the critical necessity of restoring law and order onshore as a prerequisite for ensuring security offshore. In such regions, the prospects for successful international maritime cooperation remain bleak unless the root causes of instability are addressed comprehensively (Potgieter & Schofield, 2010).

2.2 Global Responses to Maritime Crime

Maritime crime, with its intricate web of multifaceted challenges, has sparked a diverse range of responses from governments, international organizations, and private stakeholders. These responses are fundamentally driven by the imperative to safeguard critical maritime routes, protect vital economic interests, and uphold the integrity of international law. At the forefront of these concerted efforts are the roles played by navies, coast guards, and various law enforcement agencies. Their active presence within strategically important maritime zones serves as a powerful deterrent to potential criminals and simultaneously provides a rapid response mechanism to address any security breaches that may arise (Bueger, Edmunds & McCabe, 2019).

Numerous measures and initiatives have been instituted to combat the pervasive issue of maritime crime. Notably, the International Maritime Bureau has assumed a pivotal role in the collection and analysis of data pertaining to maritime piracy. The insights garnered from this data serve as valuable inputs that inform and guide the development of robust counter-piracy initiatives and strategies (Daxecker & Prins, 2017). Furthermore, it is essential to recognize the vulnerability of the maritime domain's software systems to cyber threats, underscoring the pressing need for the implementation of rigorous cybersecurity measures across maritime operations (Eichenhofer et al., 2020). In acknowledgment of the vital role played by seafarers within this domain, there have been calls for their active and direct involvement in the fight against piracy, particularly in regions such as the coast of Nigeria. This multifaceted involvement encompasses not only the enforcement of maritime security conventions but also the provision of critical testimonies against pirates during legal proceedings and trials (Anele, 2017).

However, the effectiveness of various counter-piracy and crime prevention initiatives can vary significantly. While certain measures, such as the implementation of Watch Keeping and Enhanced Vigilance protocols, have demonstrated their efficacy by dramatically increasing the chances of thwarting pirate attacks (Bryant, Townsley & Leclerc, 2014), others encounter notable challenges. For instance, the maritime law enforcement system necessitates further strengthening to provide a solid legal basis for due process, as well as to better protect the maritime rights of coastal States (Chang, 2021).

2.3 Economic Impacts of Maritime Crime

Maritime crime, encompassing a spectrum of illicit activities including piracy, smuggling, and other nefarious actions, exerts profound economic repercussions that resonate across both global and regional economies. Among the most immediate and palpable economic impacts is the significant escalation in insurance costs. As instances of maritime crime intensify, insurance premiums for ships navigating high-risk areas surge, translating into heightened

operational expenditures for shipping companies. This, in turn, can lead to elevated shipping expenses, which are frequently absorbed by consumers in the form of elevated prices for goods and commodities (Menefee, 1999). Trade disruptions represent another formidable consequence of maritime crime. When shipping routes are perceived as unsafe due to criminal activities, vessels may be rerouted to safer passages. Such rerouting not only leads to delays but also results in increased transportation costs. These disruptions can have far-reaching and cascading effects on global supply chains, particularly affecting industries and economies that rely heavily on the timely import and export of goods. Notably, maritime piracy has been empirically shown to significantly increase trade costs between Europe and Asia, underscoring the palpable and far-reaching economic ramifications of such criminal activities (Martinez-Zarzoso & Bensassi, 2013).

The broader economic landscape is profoundly influenced by maritime crime, considering the substantial economic losses incurred as a direct result of these criminal activities. This highlights the pressing need for intensified efforts from the international community to tackle this menace, even when viewed purely from an economic perspective (Fu, Ng & Lau, 2010). Furthermore, it is imperative to recognize the pivotal role played by maritime transportation in promoting economic growth, particularly when it operates efficiently and securely. It has been demonstrated that maritime transportation holds a more significant significance in driving economic growth than both air and land transport modes (Park, Seo & Ha, 2019).

On a regional scale, areas heavily reliant on maritime trade, such as certain coastal countries and regions, can experience pronounced economic downturns attributable to the scourge of maritime crime. Negative economic shocks in sectors like fisheries have been closely associated with an increase in maritime piracy, further exacerbating the economic challenges faced by these regions (Ludwig & Flückiger, 2015).

2.4 Environmental Consequences of Maritime Crime

Maritime crime, particularly concerning activities like illegal fishing and oil theft, represents a formidable and multifaceted threat to the fragile marine environment. These illicit practices disrupt the delicate balance of marine ecosystems, exacting severe ecological and environmental tolls that resonate far and wide. Illegal fishing, for instance, exerts a profound and detrimental impact on the marine environment. It results in the depletion of fish stocks, disrupts the intricate marine food chain, and has the potential to drive certain species to the brink of extinction. The consequences of overfishing, often a byproduct of illegal fishing practices, are particularly dire, with documented detrimental effects on marine biodiversity that give rise to imbalances within marine ecosystems (Glen Wright, 2011). Moreover, illegal fishing methods, such as the deployment of dynamite or cyanide, inflict irreparable damage upon delicate coral reefs and other marine habitats, further exacerbating the ecological toll.

Oil theft and the illicit bunkering activities associated with it contribute to marine pollution, posing another significant threat to the marine environment. Oil spills, whether accidental or the result of clandestine activities, unleash catastrophic effects on marine life. These spills contaminate the water, rendering it toxic for a myriad of marine species. They also coat the feathers of seabirds, impairing their ability to fly and often leading to hypothermia and death. The long-term ecological impacts of oil spills are extensive and encompass the disruption of marine food chains and the potential for lasting damage to marine habitats (Frățilă et al., 2021).

Furthermore, it is crucial to recognize that maritime crime is intricately linked to a spectrum of other environmental transgressions, including the dumping of toxic waste and pollutants into the ocean. These activities result in widespread water contamination, carrying substantial health risks for marine life and, ultimately, for humans as well. The degradation of water quality reverberates throughout the marine ecosystem, causing declines in fish populations and other vital marine resources (Jarrell & Ozymy, 2014).

2.5 International Cooperation and Partnership against Maritime Crime

The vast and intricate maritime domain necessitates a collaborative approach to effectively tackle the multifaceted challenges posed by maritime crime. International cooperation stands as a paramount requirement in this endeavor, as maritime crime frequently transcends national borders, demanding a coordinated response from various stakeholders. The essential task of reestablishing law and order ashore to ensure security offshore underscores the critical significance of international maritime cooperation. However, attaining this goal demands a concerted effort

from the global community, given the often-formidable obstacles presented by geopolitical instability and divergent national interests (*Potgieter & Schofield, 2010*).

Successful endeavors in combatting maritime crime, particularly piracy, hinge upon interdisciplinary cooperation. This necessitates the collaboration of entities possessing expertise in diverse fields, working in unison to effectively address the multifaceted nature of maritime threats (*Gottlieb, 2013*). An illustrative example can be found in the Djibouti Code of Conduct, an initiative aimed at addressing piracy and armed robbery against ships in the Western Indian Ocean and the Gulf of Aden. This code exemplifies the potential of fostering inter-regional synergies through diplomatic efforts in the Indian Ocean region (*Menzel, 2018*).

Moreover, partnerships formed among nations, organizations, and industry stakeholders have proven to be highly effective in addressing maritime challenges. The collaborative relationship between the European Union (EU) and the International Maritime Organization (IMO) serves as an exemplar of a synergistic approach driven by commitment and compliance mechanisms. This collaboration has positioned the EU as a driving force in shaping international environmental shipping policies (*van Leeuwen & Kern, 2013*). Such cooperative efforts underscore the paramount importance of shared responsibility and collective action in safeguarding maritime security and preserving the delicate balance of the world's oceans.

3. Emerging Trends and Future Challenges

Among the most pressing concerns of the maritime industry crime is the alarming rise in violence, piracy, and the sophisticated use of cutting-edge technology by a range of actors, including political extremists, ecoterrorists, and smugglers. These actors are capitalizing on technological advancements to pose formidable challenges to contemporary ship owners, shippers, and crew members, marking an unprecedented surge in maritime crime (*Menefee, 1999*).

Moreover, the interconnected and transnational nature of maritime security, coupled with its liminality, straddling both land and sea, underscores the inherent complexities of this domain. These complexities are further exacerbated by the cross-jurisdictional aspects at both national and institutional levels, often resulting in challenges related to coordination and response (*Bueger, Edmunds & Ryan, 2019*). The increasing recognition of the importance of maritime security and piracy issues reflects the evolving nature of threats and the necessity for adaptive responses (*Pristrom, Li, Yang & Wang, 2013*).

Looking ahead, potential challenges include the emergence of security assemblages in maritime space, where private actors assume prominence in the distribution of legitimate coercive force for security provision (*Gould, 2017*). The geopolitical dimension of maritime security further underscores the significant influence of geographical and geopolitical considerations on the maritime security objectives of states and international institutions (*Germond, 2015*).

To effectively navigate these complex challenges, policymakers, maritime industry stakeholders, and researchers must adopt a proactive approach. Here are some key recommendations:

1. **Enhanced Collaboration:** Foster robust collaboration between public and private stakeholders to ensure a cohesive and coordinated approach to maritime security (*Bueger & Edmunds, 2020*).
2. **Technological Advancements:** Leverage cutting-edge technology to monitor and respond to emerging maritime threats, while concurrently implementing stringent cybersecurity measures to safeguard these systems (*Eichenhofer et al., 2020*).
3. **Capacity Building:** Invest in comprehensive capacity-building initiatives aimed at equipping maritime personnel with the requisite skills and knowledge to effectively address and adapt to emerging threats (*Bueger, Edmunds & McCabe, 2019*).
4. **Research and Analysis:** Encourage and support research endeavors that provide valuable insights into the ever-evolving maritime security environment. This research is indispensable for enabling military and security leaders to comprehend, anticipate, and adapt to the dynamic challenges that lie ahead (*Yetkin, 2013*).

4. Lessons from Past Successes and Failure

The multifaceted and evolving challenges in maritime crime, has indeed been met with a diverse range of responses over the years. Reflecting on both past successes and failures offers invaluable insights that can serve as guiding

principles for shaping future strategies and interventions. One of the paramount lessons gleaned from historical efforts is the indispensable importance of reestablishing law and order ashore as a fundamental prerequisite for ensuring security offshore. Geopolitical instability and the divergence of national interests often present formidable obstacles to international maritime cooperation, underscoring the critical necessity of onshore stability for achieving maritime security (*Potgieter & Schofield, 2010*).

The dynamic nature of maritime piracy, particularly in regions like Somalia, underscores the significance of contextual understanding. Effective efforts to combat piracy must be tailored to the unique realities of the regions they impact. The decline of Somali piracy serves as a compelling case study, emphasizing the interconnectedness of maritime security within the broader context of international security and development (*Pham, 2010; Bueger, 2015*). Another vital lesson pertains to comprehending the target selection behavior of maritime criminals. Pirates' target selection patterns have demonstrated consistency with other forms of crime, such as burglary and car theft. This suggests the applicability of strategies employed in other crime prevention domains to the maritime context, offering valuable insights into potential prevention measures (*Townsend & Oliveira, 2015*).

Furthermore, the evolution of maritime crime, from traditional piracy to more technologically advanced threats involving cutting-edge technology, underscores the imperative for ongoing adaptation and innovation in response strategies (*Menefee, 1999*). Successful interventions have also underscored the significance of interdisciplinary cooperation. Addressing multifaceted maritime threats necessitates collaboration between entities possessing expertise in diverse fields, ensuring a comprehensive approach to tackling the complex challenges at hand (*Gottlieb, 2013*).

However, it is essential to acknowledge that not all endeavors have yielded success. For instance, the correlation between electoral competition in weak institutional settings and increased maritime piracy in Indonesia underscores the intricate interplay between political changes and the disruption of collusive agreements between pirates and government authorities. This insight highlights the need for nuanced approaches to address the root causes of piracy in highly competitive electoral districts (*Daxecker & Prins, 2016*).

6. Conclusions and Recommendation

Within the vast expanse of the world's oceans, the intricate tapestry of maritime activities holds a central role in shaping global geopolitics, economies, and environmental sustainability. This article has illuminated the fact that maritime crime and security transcend regional boundaries and are, in fact, global imperatives demanding immediate attention and concerted action. Several crucial takeaways emerge from this review.

First and foremost, contemporary maritime threats, spanning from piracy to environmental crimes, have evolved in both complexity and scale, necessitating a multifaceted and adaptable response. The underlying factors contributing to these threats, including economic disparities, technological advancements, and vulnerabilities in maritime infrastructure, underscore the imperative for comprehensive strategies to counteract them.

While the international legal framework governing maritime affairs boasts robust foundations, it faces considerable challenges in terms of enforcement and adaptability to evolving threats. Nevertheless, past experiences, marked by both successes and failures, offer invaluable lessons. These lessons underscore the significance of international cooperation, interdisciplinary approaches, and the need for continuous adaptation to the ever-changing maritime landscape.

The global repercussions of maritime crime, spanning economic and environmental dimensions, are profound. As maritime activities wield influence over global trade, economies, and ecological equilibrium, the stakes are undeniably high. The economic consequences, ranging from inflated insurance costs to trade disruptions, ripple through global markets. Simultaneously, environmental impacts, encompassing issues such as illegal fishing and oil theft, pose a direct threat to marine ecosystems and the broader sustainability of our planet.

Addressing these multifaceted challenges demands a united effort on multiple fronts. International cooperation and collaborative partnerships emerge as paramount. Given that maritime challenges invariably transcend national boundaries, a coordinated, global response becomes imperative. As highlighted by *Bueger et al. (2019)*, maritime security in the 21st century represents an interlinked set of challenges of growing global significance, encompassing national, environmental, economic, and human security concerns. It is in acknowledging this interconnectedness and embracing a holistic approach that we can endeavour to safeguard the maritime domain and, by extension, the well-being of our interconnected world.

References

- Bueger, C. and Edmunds, T., Blue crime: Conceptualising transnational organised crime at sea. *Marine Policy*, 2020.
- Bueger, C., Edmunds, T. and McCabe, R., Into the sea: capacity-building innovations and the maritime security challenge. *Third World Quarterly*, 2019.
- Bueger, C., Edmunds, T. and Ryan, B. J., Maritime security: the uncharted politics of the global sea. *International Affairs*, 2019.
- Daxecker, U. E. and Prins, B. C., The politicization of crime: electoral competition and the supply of maritime piracy in Indonesia. *Public Choice*, 169, pp.375-393, 2016.
- Eichenhofer, J. O., Heymann, E., Miller, B. and Kang, A., An In-Depth Security Assessment of Maritime Container Terminal Software Systems. *IEEE Access*, 2020.
- Frăţilă (Adam), A., Gavril (Moldovan), I. A., Niţă, S. and Hrebenciuc, A., The Importance of Maritime Transport for Economic Growth in the European Union: A Panel Data Analysis. *Sustainability*, 2021.
- Fu, X., Ng, A. and Lau, Y., The impacts of maritime piracy on global economic development: the case of Somalia. *Maritime Policy & Management*, 37, pp.677-697, 2010.
- Germond, B., The geopolitical dimension of maritime security. *Marine Policy*, 2015
- Gottlieb, Y., Combating Maritime Piracy: Inter-Disciplinary Cooperation and Information Sharing. *Case Western Reserve Journal of International Law*, 46, pp.303-320, 2013.
- Gould, A., Global assemblages and counter-piracy: public and private in maritime policing. *Policing and Society*, 2017.
- Jarrell, M. L. and Ozymy, J., Few and far between: understanding the role of the victim in federal environmental crime prosecutions in the United States. *Crime, Law and Social Change*, 61, pp.563-584, 2014.
- Ludwig, M. and Flückiger, M., Economic Shocks in the Fisheries Sector and Maritime Piracy. *Journal of Conflict Resolution*, 57, pp.940-965, 2015.
- Martínez-Zarzoso, I. and Bensassi, S., THE PRICE OF MODERN MARITIME PIRACY. *Defence and Peace Economics*, 24, pp.397-418, 2013.
- Menefee, S., Anti-Piracy Law In The Year Of The Ocean: Problems And Opportunity. *ILSA Journal of International and Comparative Law*, 5, pp.309-318, 1999.
- Menzel, A., Institutional adoption and maritime crime governance: the Djibouti Code of Conduct. *Journal of the Indian Ocean Region*, 14, pp.152-169, 2018.
- Park, J., Seo, Y. and Ha, M., The role of maritime, land, and air transportation in economic growth: Panel evidence from OECD and non-OECD countries. *Research in Transportation Economics*, 78, p.100765, 2019.
- Pham, J., Putting Somali piracy in context. *Journal of Contemporary African Studies*, 28, pp.325-341, 2010.
- Potgieter, T. and Schofield, C., Poverty, poaching and pirates: geopolitical instability and maritime insecurity off the Horn of Africa. *Journal of the Indian Ocean Region*, 6, pp.112-86, 2010.
- Pristrom, S., Li, K. X., Yang, Z. and Wang, J., A study of maritime security and piracy. *Maritime Policy & Management*, 2013.
- Ryan, B. J., Security spheres: A phenomenology of maritime spatial practices. *Security Dialogue*, 2015.
- Townsley, M. and Oliveira, A., Space-time dynamics of maritime piracy. *Security Journal*, 28, pp.217-229, 2015.
- van Leeuwen, J. and Kern, K., The External Dimension of European Union Marine Governance: Institutional Interplay between the EU and the International Maritime Organization. *Global Environmental Politics*, 13, pp.69-87, 2013.
- Wright, G., Conceptualising and combating transnational environmental crime. *Trends in Organized Crime*, 14, pp.332-346, 2011.
- Yetkin, U., Revealing the Change in the Maritime Security Environment through Porter's Five Forces Analysis. *Defence Studies*, 2013.

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