


# The Importance of Digital Transformation in Maritime Law Enforcement at Sea

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Article Info	ABSTRACT
<p><b>Keywords:</b> Digital Transformation, Maritime Law Enforcement, Maritime Security</p>	<p>Maritime law enforcement is an important aspect in maintaining security and sustainability of maritime activities at sea. However, complex challenges such as territorial expansion, increasing illegal activities, and cross-border presence demand the adoption of new technologies in maritime law enforcement. This research examines the importance of digital transformation as an effective solution in increasing the efficiency and effectiveness of maritime law enforcement at sea. This research uses a normative legal approach based on applicable regulations. The research results show that digital transformation has a positive impact on maritime law enforcement at sea. Information system integration enables data exchange between law enforcement agencies, strengthens cross-agency collaboration, and increases operational efficiency. The use of digital technology also makes it possible to detect and deal with illegal activities at sea, such as illegal fishing and smuggling, more effectively. In addition, digital transformation provides a solid foundation for holistic and sustainable maritime policymaking, supporting more effective and sustainable management of marine resources in the long term.</p>
<p>This is an open access article under the <a href="#">CC BY-NC</a> license</p> 	<p><b>Corresponding Author:</b> Irma Rachmawati Maruf Universitas Pasundan, Bandung, Indonesia <a href="mailto:Irma.rachmawati@unpas.ac.id">Irma.rachmawati@unpas.ac.id</a></p>

## INTRODUCTION

The digitalization of information systems provides great potential to improve a more comprehensive approach in the field of maritime security and safety. However, amidst technological advances, there are still challenges that must be overcome (Viana, 2009). One of the main problems is the existence of blank spots in the ocean that are difficult for monitoring systems to reach. Even though this era has been known as the "all-satellite" era, images produced from satellites do not always provide a clear picture of conditions in the ocean (Puspitawati, 2017). This results in difficulties in obtaining real-time data and information regarding events occurring at sea. Even when using messaging, not all data providers can reach these areas, and even if they do, the costs tend to be high (Sihombing, 2017).

However, there are efforts that can be made to overcome this obstacle. One way is to utilize existing technology more effectively, such as improving sensor networks at sea, improving data collection and analysis systems, and increasing collaboration between law enforcement agencies, academics and the private sector in developing innovative solutions

(Putra, 2022). Apart from that, it is also important to encourage investment in research and development of technology that can overcome the problem of blank spots in the ocean. Thus, it can be hoped that through joint efforts and the use of appropriate technology, these blank spots can be minimized so that maritime law enforcement in Indonesia can become more effective and efficient (Soemarmi et al, 2020).

The application of digital transformation in maritime law in Indonesia is becoming increasingly important considering the complexity of the challenges faced at sea. Indonesia, with the largest archipelago in the world, faces various problems related to security and maritime law enforcement, ranging from drug smuggling, illegal fishing, to ship accidents (Salsabilla et al, 2023). Digital transformation can be an effective solution to improve supervision and law enforcement in Indonesia's vast territorial waters. With the adoption of technology such as satellite monitoring systems, big data processing, and the use of artificial intelligence, authorities can efficiently track illegal activities, analyze behavioral patterns, and take preventive and law enforcement actions more quickly and precisely (Sarjiyo, 2023).

Apart from that, implementing digital transformation will also help improve coordination between relevant agencies in Indonesia, such as the Maritime Security Agency, Police, and Marine Resources and Fisheries Monitoring Agency (Deanto & Marzaman, 2024). With the adoption of integrated information systems, information can be disseminated more effectively and response times to incidents at sea can be accelerated. Apart from that, the application of digital technology can also increase transparency and accountability in maritime law enforcement, ensuring that decisions taken are based on accurate and reliable data (Pradana, 2022). Therefore, through implementing digital transformation in maritime law, Indonesia can optimize resources and strengthen its maritime sovereignty, as well as increase the protection of marine resources and the security of its territorial waters (Putri & Burhannudin, 2024).

The issuance of Government Regulation (PP) Number 13 of 2022 concerning the Implementation of Security, Safety and Law Enforcement in Indonesian Maritime Areas and Indonesian Jurisdictional Areas marks an important step in increasing supervision and law enforcement in Indonesian seas (Tampi, 2023). Article 36 of the PP provides a clear mandate regarding the integration of national maritime security and safety information systems, which must be carried out no later than six months after the PP is promulgated. Thus, 2022 is the deadline set to complete the integration of the information system (Yusuf et al, 2023).

The implementation of this integrated information system is expected to increase efficiency and effectiveness in monitoring and law enforcement in Indonesian waters (Andini et al, 2023). With integration, information related to maritime security and safety can be accessed in real-time and in an integrated manner by various related agencies, including the Maritime Security Agency, Police and other institutions (Hozairi et al, 2018). This will enable a fast and precise response to various incidents at sea, from ship accidents to illegal activities such as smuggling and illegal fishing. As a consequence of PP no. 13/2022, the Indonesian government is expected to ensure that the integration of the

national maritime security information system is completed on time, thereby providing a strong foundation for increasing protection of Indonesia's territorial waters and its marine resources (Arletiko, 2017).

The advantages of digitalization in maritime law enforcement include increasing the amount of real-time information that can be accessed from various sources, increasing the accuracy and consistency of data between agencies, and the ability to carry out better analysis (Saifulloh & Simabura, 2023). With wider access to data, law enforcement can make more informed and responsive decisions, shorten enforcement times and reduce operational costs. Overall, this digitalization provides a strong deterrent against illegal activities at sea, increases the effectiveness of maritime law enforcement, and strengthens cooperation between law enforcement agencies (Santoso & Fadholi, 2023).

The aim of this research is to identify and analyze the impact and benefits of digital transformation in maritime law enforcement at sea, especially in the Indonesian context. The benefits include increasing monitoring capabilities and taking action against illegal activities at sea, increasing cooperation between agencies in law enforcement, as well as reducing operational costs and response times in responding to incidents at sea. Thus, it is hoped that this research can provide valuable insights for policy makers, legal practitioners and relevant stakeholders in utilizing the potential of digital transformation to improve safe and sustainable marine governance in Indonesia.

## METHOD

In this research, the type of research used is normative legal research. The main characteristic is the use of legal materials as the main source, which consists of normative rules (Soekanto, 2007). The approaches used include the statutory approach and the analytical and conceptual approach. The legislative approach requires a thorough review of all laws and regulations relating to the legal issue being researched, while the conceptual approach involves the development of concepts that can be used as a reference in research. Thus, this research aims to gain a comprehensive understanding of the impact and benefits of digital transformation in maritime law enforcement at sea, using legal materials as the main analytical basis.

## RESULTS AND DISCUSSION

### The Impact of Digital Transformation in Maritime Law Enforcement at Sea

#### 1. Increased Operational Efficiency

The integration of information technology has had a significant impact on maritime law enforcement at sea by speeding up the process of identifying and taking action against law violators. Through satellite monitoring systems, big data analysis and artificial intelligence, authorities can quickly identify suspicious or illegal activities in marine waters. The ability to track and monitor vessel movements in real-time allows law enforcement to respond more quickly to incidents and carry out necessary actions in a timely manner. In this way, the response time in responding to incidents can be shortened significantly, which

in turn increases the chances of catching perpetrators of maritime crimes and reduces the potential losses incurred.

Apart from that, the integration of information technology also brings benefits in reducing operational costs in maritime law enforcement. With an automated and integrated system, the data collection and analysis process becomes more efficient, reducing the need for human resources and the time required to perform these tasks manually. In addition, the use of technology can also optimize the use of physical resources such as patrol boats and surveillance aircraft, thereby reducing operational costs related to maintenance and fuel. Thus, the integration of information technology not only increases the effectiveness of maritime law enforcement, but also helps in managing operational budgets more efficiently for law enforcement agencies.

## **2. Accuracy and Responsiveness**

The use of satellite monitoring systems, big data analysis and artificial intelligence has brought about a significant transformation in maritime law enforcement at sea. By using satellite monitoring systems, authorities can effectively monitor and track ship movements in maritime waters in real-time. Big data analysis enables the identification of suspicious or anomalous behavioral patterns, such as unusual navigation patterns or suspicious vessel activity. In addition, by applying artificial intelligence, the system can process data quickly and accurately, analyze information from various sources in more depth, and identify potential illegal activities more precisely. Thus, the integration of this technology not only increases accuracy in identifying illegal activities at sea, but also accelerates responsive decision-making by law enforcement agencies.

Apart from increasing accuracy, the use of information technology also accelerates responsive decision making in maritime law enforcement. With the ability to monitor ship movements in real-time and analyze data quickly, authorities can respond quickly to incidents or suspicious activity at sea. This allows for more precise and efficient decision making in following up on potential legal violations, such as illegal fishing or smuggling. With the use of artificial intelligence, the system can generate recommendations for action based on in-depth data analysis, allowing law enforcement to respond more quickly and effectively to developing situations at sea. Thus, information technology not only increases accuracy in identifying illegal activities, but also speeds up response times in facing complex maritime security challenges.

## **3. Increased Interagency Cooperation**

Information system integration has opened the door to cross-agency collaboration in maritime law enforcement by enabling real-time exchange of information. With an integrated connected system, law enforcement agencies can easily share data and information related to maritime security, maritime incidents and ship activities in territorial waters. This allows various institutions, such as the Maritime Security Agency, the Police, and other agencies, to work together to monitor and respond to various maritime security threats effectively. Through rapid and structured information exchange, law enforcement agencies can support each other in coordinating responses to emergency situations,

investigating cross-border maritime crimes, and carrying out joint operations to apprehend perpetrators of crimes at sea.

Furthermore, information system integration not only strengthens cross-agency cooperation, but also increases efficiency and effectiveness in maritime law enforcement as a whole. With access to integrated information, law enforcement agencies can make better and more informed decisions in responding to incidents or illegal activities at sea. Better coordination between agencies also allows for a more efficient and strategic allocation of resources in maritime law enforcement, including the use of patrol vessels, surveillance aircraft and field personnel. Thus, integration of information systems not only strengthens cross-agency cooperation, but also provides a solid foundation for increasing effectiveness and efficiency in maintaining maritime security and enforcing maritime law in territorial waters.

#### **4. Increasing Supervision and Law Enforcement**

The use of digital technology has opened up opportunities to carry out more effective monitoring of various activities at sea, including illegal fishing, smuggling and other maritime crimes. Through a sophisticated satellite and sensor monitoring system, authorities can monitor ship movements in real-time in various water areas. This makes it possible to detect suspicious or unusual activity patterns, such as vessels making unusual maneuvers or operating in restricted areas. With the adoption of technologies such as big data analytics and artificial intelligence, authorities can also analyze data in greater depth to identify potential violations of the law. This provides greater capabilities in anticipating and preventing maritime crime, as well as increasing effectiveness in prosecuting violations.

Furthermore, digital technology also increases law enforcement capabilities in cracking down on violations at sea. With better access to information and a deeper understanding of maritime activity, authorities can respond more quickly and appropriately to incidents or violations of the law that occur. In addition, with the adoption of technology such as the use of drones and autonomous ships, maritime law enforcement can be carried out more efficiently and safely. This technology also allows for the collection of stronger and more accurate evidence in the investigation and law enforcement process, which can ultimately increase the success rate in maritime law enforcement and provide a deterrent effect for perpetrators of crimes at sea.

#### **5. Deterrence against Illegal Activities :**

Digital transformation has proven itself to be a stronger bulwark against illegal activities at sea, which in turn increases security and order in maritime waters. With advanced satellite monitoring systems and big data analysis, authorities have greater capabilities to detect and identify illegal activities such as illegal fishing, smuggling and other maritime crimes. This capability makes it more difficult for criminals to operate undetected, as digital technology allows for broader and more accurate monitoring across water areas. With these greater barriers in place, the potential to reduce crime incidents at sea increases significantly, ultimately improving security and order at sea.

Furthermore, digital transformation also provides strategic advantages for law enforcement agencies in fighting illegal activities at sea by improving detection, response

and prevention capabilities. With digital technology such as artificial intelligence, authorities can process data more quickly and accurately, and identify suspicious behavioral patterns. This allows for a quicker and more effective response to crime incidents, including dispatching patrol vessels or taking more timely law enforcement action. Thus, digital transformation not only increases success in countering illegal activities at sea, but also provides a big boost in improving security and order in sea waters which are vital for the continuity of maritime activities.

## **6. Role as Maritime Policy Supporter**

The impact of digital transformation in maritime law enforcement goes beyond the operational level and provides strong support for the implementation of more holistic and effective maritime policies. Digital technologies enable authorities to collect, analyze and share data more efficiently, strengthening the information foundation for accurately informed policymaking. This enables stakeholders at the policy level to make more informed and strategic decisions in designing and implementing broad maritime policies. Through big data analysis and artificial intelligence, digital technology also helps in understanding trends and challenges faced in the maritime sector, enabling policy making that is more adaptive and responsive to environmental and social changes at sea.

In addition, digital transformation provides strong support for inter-institutional coordination and cross-sector cooperation in implementing maritime policies. Integration of inter-agency information systems enables smooth and integrated data exchange, facilitating closer collaboration between government agencies, the private sector and civil society in achieving broader policy goals. This encourages the creation of a holistic and integrated framework for managing marine resources, maintaining environmental sustainability, and strengthening the country's maritime sovereignty. Thus, the impact of digital transformation in maritime law enforcement not only strengthens operations, but also provides a solid foundation for the development of inclusive, adaptive and sustainable maritime policies.

## **Benefits of Digital Transformation in Maritime Law Enforcement at Sea**

### **1. Increased Efficiency**

Digital transformation has paved the way for more efficient maritime law enforcement by leveraging technology to monitor maritime activities more effectively. Through sophisticated satellite monitoring systems and marine sensors, authorities can monitor ship movements in real-time throughout the waters. This allows them to quickly and accurately detect suspicious or illegal activities, such as illegal fishing or smuggling. In addition, by applying big data analysis and artificial intelligence, the collected information can be analyzed in depth to identify suspicious behavior patterns, speed up decision making in responding to incidents, and develop more effective response strategies. In this way, the maritime law enforcement process becomes more efficient and responsive to security threats at sea.

Furthermore, digital technology also allows law enforcement to respond to incidents at sea more quickly and precisely. With the adoption of advanced communications technologies, such as satellite communications systems and integrated information

networks, authorities can coordinate effectively and carry out law enforcement actions more quickly. This is especially important in emergency situations or incidents that require a rapid response, such as shipwrecks or maritime crimes. By utilizing technology to respond quickly and precisely, law enforcement can reduce the negative impact of these incidents and ensure that security and order in maritime waters are maintained.

## **2. Improve Security**

Digital transformation has brought significant changes in efforts to prevent and control illegal activities at sea, such as illegal fishing and smuggling, which in turn increases the overall security of maritime waters. Through the use of technology such as satellite monitoring systems and advanced marine sensors, authorities can effectively monitor and detect suspicious activities at sea, including vessels involved in such illegal activities. Big data analysis and artificial intelligence enable them to identify suspicious behavioral patterns, estimate potential locations of illegal activities, and plan appropriate law enforcement operations. With a more sophisticated and responsive monitoring system, it becomes more difficult for maritime criminals to operate undetected, thereby increasing the safety and security of marine waters for seafarers and the maritime environment as a whole.

In addition, digital transformation also allows authorities to increase effectiveness in tackling illegal activities at sea in a more proactive and coordinated manner. With smoother exchange of information between law enforcement agencies and enhanced cross-border cooperation, they can design and implement more efficient and effective law enforcement strategies. This includes setting up routine patrols, monitoring areas prone to illegal activities, as well as coordinating with international institutions in handling cases of cross-border smuggling. Thus, through the application of digital technology, efforts to prevent and control illegal activities at sea can be strengthened, which ultimately contributes to increasing security and order in global maritime waters.

## **3. Strengthening Cross-Agency Collaboration**

Information system integration has become the main driver in strengthening cross-agency cooperation in maritime law enforcement. Through the smooth exchange of information between law enforcement agencies, this integration facilitates closer and more efficient coordination in dealing with maritime security issues. For example, agencies such as the Police, Maritime Security Agency and Port Authorities can share the latest data and intelligence regarding ship activity, vulnerable areas and suspected violations of the law. With faster and more unified access to this information, authorities can respond more quickly to emergency situations and plan more coordinated and effective law enforcement operations.

Apart from that, integration of information systems also strengthens synergy between law enforcement agencies in facing complex challenges at sea. By sharing data and information resources in an integrated manner, these agencies can complement each other in risk analysis, identification of crime trends, and development of law enforcement strategies. This enhanced cross-agency collaboration also creates opportunities for the exchange of knowledge and best practices, which in turn increases the overall capacity and

quality of maritime law enforcement. Thus, integration of information systems not only strengthens cross-agency cooperation, but also strengthens collective capabilities in maintaining security and order in maritime waters.

#### **4. Optimizing Resource Use**

The application of digital technology has brought about a paradigm shift in the use of resources in maritime law enforcement. Through technology such as satellite monitoring systems and artificial intelligence, law enforcement agencies can monitor and analyze activities at sea more efficiently. This allows them to allocate resources more appropriately and effectively, including the use of patrol boats and law enforcement personnel. For example, by leveraging the data and analysis provided by digital technology, authorities can identify areas or times of day that have the greatest potential for illegal activity at sea, and can direct their patrol vessels to these areas more intelligently. In addition, digital technology also enables the use of patrol vessels equipped with advanced monitoring and navigation systems, increasing efficiency in carrying out law enforcement missions and maximizing operational reach.

Furthermore, digital technology also enables the use of law enforcement personnel in a more efficient manner. By adopting technology such as integrated information and communication management systems, law enforcement personnel can access the information and coordination they need more quickly and easily. This allows them to respond to incidents or emergency situations more quickly and precisely, without wasting valuable time in the coordination process. Additionally, digital technology also enables more effective training and development of law enforcement personnel, by providing access to online educational and training resources, real-time simulations, and interactive learning platforms. Thus, the application of digital technology not only increases efficiency in the use of resources such as patrol vessels and law enforcement personnel, but also strengthens overall operational capabilities in maritime law enforcement.

#### **5. Support for Maritime Policy**

Digital transformation has become a fundamental pillar in the preparation and implementation of holistic, adaptive and sustainable maritime policies. By utilizing sophisticated information and communication technology, policy makers can access the latest data and information regarding ocean conditions more quickly and precisely. This allows them to make decisions that are based on a deeper understanding of the challenges and opportunities faced in marine resource management. Apart from that, digital technology also facilitates public participation in the policy-making process through online public consultation platforms and open discussion forums, which enable the alignment of community needs and expectations with the established policy agenda.

Furthermore, digital transformation also supports the implementation of adaptive and sustainable maritime policies by providing tools and methods for continuous monitoring, evaluation and adjustment to the effectiveness of the policies implemented. With a technology-based monitoring and reporting system, policy makers can track the progress of policy implementation and its impact on the maritime environment and society. This allows them to make necessary changes and adjustments so that policies can run effectively in



accordance with existing dynamics. Thus, digital transformation not only provides a solid foundation for holistic and sustainable maritime policy making, but also enables the implementation of policies that are adaptive and responsive to environmental changes and the needs of maritime communities.

## CONCLUSION

Digital transformation has a significant impact on maritime law enforcement and marine resource management. Through the application of sophisticated information and communication technology, maritime law enforcement becomes more efficient and responsive, enabling more effective detection, response and prevention of illegal activities at sea. Integration of information systems strengthens cross-agency cooperation and facilitates the exchange of information between law enforcement agencies, while the application of digital technology also optimizes the use of resources such as patrol boats and law enforcement personnel. In addition, digital transformation provides a solid foundation for the creation and implementation of holistic, adaptive and sustainable maritime policies by providing access to the necessary data and information as well as tools for continuous monitoring and evaluation. Thus, digital transformation not only increases the effectiveness of maritime law enforcement, but also supports efforts to manage marine resources more effectively and sustainably, strengthening the security and sustainability of the maritime environment as a whole.

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