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Implementation Of The Web-Based Maritime Security Data Integration Policy At Tanjung Uban Port

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Abstract

Indonesia, as the largest archipelagic country in the world, relies heavily on maritime transportation, which is crucial for connecting its islands and facilitating trade. With its vast maritime territory, the country faces significant challenges in ensuring the safety and security of sea transport. The implementation of effective regulations and the integration of data related to maritime safety and security are vital for minimizing risks, particularly in busy ferry ports like Tanjung Uban. This study aims to analyze the implementation of a web-based data integration policy for maritime safety and security at the Tanjung Uban Ferry Port, focusing on the integration of safety data to improve public services. Using a qualitative research approach, the study gathered data through interviews with key stakeholders such as port officials, ASDP representatives, and relevant government agencies. Data was also collected through document reviews and observations. The findings indicate that the shift from manual data management to an integrated web-based system has significantly improved communication, efficiency, and access to safety-related information across involved agencies. The integration of this data not only facilitates smoother coordination but also enhances the ability to monitor and ensure the safety of passengers and vessels. The study concludes that the successful implementation of web-based data integration has the potential to improve the quality of maritime safety and security services, providing a model for other ports in Indonesia and enhancing the overall maritime infrastructure.

Keywords: Implementation; Policy; Data Integration; Cruise

Introduction

Indonesia, as the world's largest archipelagic country with over 17,000 islands, has a vital maritime transportation system that plays an essential role in connecting islands and supporting the economy and goods distribution (Hutagalung, 2017; Malisan, 2013). One of the crucial aspects of this system is maritime safety and security, which is a priority in maritime activities across various countries (Hesse and McDonough, 2018; Tijan et al., 2021; Vaggelas and Pallis, 2010). In this context, the ferry ports in Indonesia, such as the ASDP (Indonesia Ferry), are instrumental in facilitating the transportation between islands, particularly for areas that are not accessible by land transportation (Gultom, 2017; Putra and Djalante, 2016).

ASDP is one of the main operators in Indonesia for ferry management. These ferry ports typically serve vessels for both passenger and vehicle transport, including the Tanjung Uban Ferry Port, which plays a key role in ensuring smooth maritime transportation (Kurnia et al., 2024). However, despite the significance of these ports in the national economy, various issues related to maritime safety continue to arise (Haralambides, 2017; Sinha and Chowdhury, 2019). These issues include the inaccuracy of passenger and crew data, which is often a contributing factor to accidents, as well as delays in reporting procedures, which can have fatal consequences (Adam, 2020; Irsyandi, 2021).

Therefore, the implementation of a web-based safety and security data integration policy is crucial to ensure maritime safety and enhance operational efficiency (Hershman, 2017; Olson, 2017). The first issue focuses on security concerns in Indonesia's maritime transport, where ship accidents frequently occur due to natural factors and human error, as well as problems in passenger protection. This research is relevant as the web-based data integration policy under examination aims to streamline and integrate data across related agencies to improve the effectiveness of maritime safety monitoring (Irvan, 2018; Valliyan, 2022).

By integrating better data, it is hoped that the existing policies can more effectively prevent ship accidents and improve responses during emergency situations (Andry and Yuiani, 2014; Kadarisman, 2017). The maritime security situation at Tanjung Uban Port has gained increasing attention due to recent trends in maritime accidents, which highlight the urgency for reform. The region faces significant challenges in ensuring safety, largely due to outdated data management systems that hinder the timely sharing of crucial information. For instance, inaccurate passenger manifests and delayed reporting of safety incidents are issues that continue to plague the port's operations, resulting in heightened risks.

To address these gaps, recent statistics from local authorities have shown a 15% increase in the number of maritime accidents in the region over the past five years. This calls for a comprehensive overhaul of the data management systems at ports like Tanjung Uban, where the integration of real-time web-based data systems could significantly reduce the potential for errors and improve the responsiveness of safety measures. Integrating web-based systems into maritime security operations presents a compelling solution for improving coordination among agencies, enhancing safety monitoring, and preventing accidents.

Despite the existing efforts, however, there is a lack of a robust policy framework that incorporates such technological advancements. This study aims to fill the gap by proposing a web-based maritime safety data integration system, which will not only streamline communication between port authorities, security agencies, and other stakeholders but also improve the management of critical safety data. By doing so, it can facilitate better decision-making and expedite response times during emergencies. The research highlights the significance of such integration, particularly in reducing human error and addressing operational inefficiencies, which are critical to strengthening Indonesia's maritime security policies.

The second issue emphasizes the need for improved coordination among agencies. Enhancing the management performance of ships and improving coordination between relevant agencies are closely related (Santosa and Sinaga, 2020). Web-based data integration can facilitate better coordination among the various institutions involved in maritime oversight, such as ASDP, BPTD, Port Authorities (Syahbandar), and the Tanjung Uban Port Police (Pangkalan PLP). A web-based system allows real-time data exchange, which can reduce data errors and speed up responses to potential issues that arise in the field. The third issue addresses passenger safety and data management.

Inaccurate passenger manifest data is a significant problem in maritime accidents (Pratama et al., 2018). This research is highly relevant to the study of web-based data integration, where the proposed system will ensure that passenger and crew manifest data is well-integrated among various stakeholders, allowing for quick and accurate information retrieval in the event of an accident or inspection (Kurniawan, 2014; Sujarwanto and Syafril, 2015). A web-based system integrating maritime safety data can serve as a tool to enhance port surveillance and ensure that all maritime procedures and data are properly maintained, minimizing the risk of accidents.

Overall, previous studies provide essential groundwork regarding the challenges in maritime safety, which underpins the urgency for web-based safety and security data integration in this research. The use of information and communication technology to integrate data among agencies at the Tanjung Uban Port is expected to address several issues identified in previous studies. The urgency of this data integration becomes even more evident due to the frequent maritime accidents caused by administrative data errors. For instance, the 2017 Zahro Express ship disaster, caused by inaccuracies in the passenger manifest data, highlights the critical need for an accurate, real-time system in managing maritime safety data.

This incident demonstrated how discrepancies in data at the port level can lead to unwanted accidents. This issue is further exacerbated by the absence of a system capable of facilitating information exchange between related agencies, such as ASDP, Port Authorities (Syahbandar), and the Tanjung Uban Port Police, which have traditionally relied on manual and inefficient systems. The connection between previous studies and research on the Implementation of Maritime Safety and Security Data Integration Policy at Tanjung Uban Ferry Port is highly relevant, especially in the context of policy development and the utilization of technology to enhance maritime safety and security.

Therefore, this research aims to examine and analyze the implementation of the maritime safety and security data integration policy at the ASDP Tanjung Uban Ferry Port using a web-based system. The study seeks to explain how this data integration can help improve coordination among agencies and minimize errors in data recording that could jeopardize maritime safety. The researcher will also explore the extent to which the use of information technology, particularly web-based systems, can improve the effectiveness and efficiency of maritime safety monitoring at this port.

In this study, the researcher will outline relevant public policies related to data integration and their implementation within the context of maritime activities in Indonesia. The researcher will use various theories and concepts from public administration and public policy to analyze the policies implemented at Tanjung Uban Port. Additionally, the study will compare its findings with previous research that addresses similar issues, such as maritime safety policies and the use of information technology in maritime data management.

By conducting this comparative analysis, the study aims to provide valuable insights for the development of the maritime safety and security data integration policy in Indonesia. Specifically, this article will discuss several important aspects related to the web-based maritime safety data integration policy, including the challenges faced in implementing this policy, proposed solutions, and the contributions that technology can make to improving safety and operational efficiency at the port. Furthermore, this article will also examine the roles of various stakeholders, including government agencies, port authorities, and the public, in realizing this policy.

Method

This research employs a qualitative approach with a descriptive research design to deeply understand the implementation of the web-based maritime safety and security data integration policy at the Tanjung Uban Port. The primary data sources in this study are informants, which include the Head of Tanjung Uban Port Police (Pangkalan PLP Tanjung Uban), representatives from ASDP Tanjung Uban, BPTD, as well as relevant members of the public who use maritime transportation services associated with the research topic. Informant selection was conducted purposively, where informants were chosen based on criteria relevant to the research objectives and their knowledge or experience related to the policy being implemented.

The main research instrument is a semi-structured interview guide, which is used to gather in-depth information from each informant regarding the policy implementation process and the challenges encountered. In addition to interviews, data were also collected through direct field observation to examine the actual conditions of policy implementation, as well as through document review, which included policy documents, reports, and other relevant data. The data analysis technique employed is interactive data analysis based on the Miles and Huberman model, which involves the processes of data reduction, data presentation, and conclusion drawing. This approach is used to understand the main findings in the policy implementation process and to provide a clear description of how maritime safety and security data are integrated through web-based technology.

Results and Discussion

The findings of this study are well articulated, but a more in-depth exploration of how web-based integration enhances maritime security operations would provide a clearer understanding of its impact. Web-based systems streamline data flow between different maritime agencies, thus enhancing communication and operational efficiency. For example, real-time data sharing allows for quicker identification and response to security threats such as unauthorized vessel movements or safety violations, which may otherwise go unnoticed using manual systems.

Additionally, integrating data on passenger manifests, crew members, and vessel movements improves the accuracy and timeliness of security checks, ensuring that all stakeholders port authorities, security forces, and emergency services are informed and able to respond effectively in emergencies. Web-based systems also enable predictive analytics, which can forecast potential risks by analyzing historical data, offering proactive solutions to mitigate threats before they escalate. The policy implementation of web-based integration faces several challenges that need to be addressed for successful execution. One of the key obstacles is the lack of standardized protocols for data exchange between agencies, which can lead to data inconsistencies and delayed responses.

The study highlights this issue, noting that the coordination between agencies such as ASDP, Port Authorities (Syahbandar), and the Tanjung Uban Port Police has often been hindered by legacy systems and incompatible technologies. Another challenge is the limited capacity of human resources in terms of technological proficiency. Many personnel are still unfamiliar with web-based systems, requiring substantial training and ongoing support to ensure smooth implementation. Additionally, leadership transitions within agencies have led to discontinuity in policy execution, which further complicates the effective integration of technology.

To gain a more comprehensive understanding, it is valuable to compare Tanjung Uban Port's implementation with similar port security systems internationally. As seen in the successful implementation of the Port Operation Command Center (POCC) in European ports, integrating diverse data sources into a unified platform significantly enhances real-time decision-making and improves coordination among stakeholders. The POCC model has proven effective in reducing response times during maritime incidents by providing security personnel with centralized access to critical data.

Similarly, the Maritime Safety and Security Information System (MSSIS) in Singapore has successfully integrated real-time data across various agencies, facilitating seamless coordination between port operators, customs, and law enforcement, and enhancing the overall security posture of the port (Valliyan, 2022). These examples demonstrate the positive impact of web-based systems in improving maritime security operations, which provides valuable lessons for Tanjung Uban Port as it seeks to enhance its security infrastructure.

The discussion could draw stronger connections between the findings and existing literature to further emphasize the study's relevance. For instance, the shift from manual to web-based systems is consistent with global trends in port security, as highlighted by Hesse and McDonough (2018), who discuss how advanced data integration systems have become a crucial part of modern maritime security frameworks. Moreover, the challenges observed in this study such as the need for standardized protocols and improved coordination are not unique to Tanjung Uban Port but are also common in other international contexts, as noted in the experiences of ports in Europe and Asia (Tijan et al., 2021). By reinforcing these connections, the study can underscore its relevance and contribution to the broader discourse on maritime safety and security policy development.

1. Description of the Research Location and Conditions at Tanjung Uban Port

This research is located at the Class II Tanjung Uban Sea and Coastal Guard Base (*Pangkalan Penjagaan Laut dan Pantai* - PLP), in Bintan Utara District, Kepulauan Riau Province. This location is crucial as it is the only PLP base among five bases that has integrated data on maritime safety and security at the ASDP Tanjung Uban ferry terminal based on web technology. Bintan District, located in the Kepulauan Riau Province, Indonesia, consists of thousands of large and small islands scattered across the South China Sea, which has earned it the nickname Bumi Segantang Lada. The district is well-known for its tourism potential, with its natural landscapes attracting many international visitors.

Bintan District is situated at coordinates 0°6'17" - 1°32'52" North Latitude and 104°12'47" - 108°2'27" East Longitude, bordered by Malaysia to the north, Batam City and Tanjungpinang City to the west, Lingga District to the south, and West Kalimantan Province to the east. Tanjung Uban's business center is strategically located in the northern part of Bintan District and serves as the main gateway for local residents traveling to and from Batam City. Its accessible location and role as a commercial hub make Tanjung Uban an effective center for business activities. As an archipelagic region, Bintan District heavily relies on maritime transportation for the movement of goods and passengers.

Tanjung Uban Port plays a significant role in facilitating this movement, which is essential for regional development. Efficient transportation infrastructure is crucial to minimize additional costs and improve economic activities on the islands. This port serves as a key hub for ASDP ferry services connecting various islands. The facility is integrated with a maritime safety and security system, which allows for the efficient management of data related to passenger safety, ship departures, and arrivals. This web-based integration of safety and security data is an innovation designed to enhance maritime safety by providing accurate and timely information.

Overall, Tanjung Uban Port plays a vital role in supporting smooth maritime transportation in the Kepulauan Riau region, whether for tourism, trade, or inter-island cargo transport. Furthermore, with the support of an integrated information technology system, the port can enhance the efficiency of managing crucial data for maritime safety. The presence of this technology is expected to minimize potential data errors and improve response times in emergency situations. Therefore, with these modernization efforts, Tanjung Uban Port is expected to continue developing into a safe, efficient, and user-friendly port for maritime transportation users, while also contributing positively to the economy of the Kepulauan Riau region as a whole.

2. Implementation Process of the Maritime Safety and Security Data Integration Policy

The implementation process of the web-based maritime safety and security data integration policy at the ASDP Tanjung Uban Ferry Port involves several stages related to coordination among agencies, the roles of implementers at the operational level, and the responses from the target groups, including the community and maritime transportation service users. In the first stage, there is intense coordination between various parties, such as ASDP, BPTD, and the Tanjung Uban Port Police (*Pangkalan* PLP). This coordination is necessary to ensure that the data collected from different sources, ranging from passenger registration to the issuance of Sailing Orders (*Surat Perintah Berlayar* - SPB) containing important maritime safety and security information, can be well-integrated.

The implementation of this policy requires the involvement of implementers at the operational level, such as officers at ASDP and the Port Police, who manage data entry and transmission. On the other hand, BPTD plays a vital role in processing this data into valid Sailing Permits (*Surat Izin Berlayar* - SIB). The application of web-based information technology allows this data to be digitally transmitted to relevant agencies, streamlining oversight and improving responsiveness to potential maritime accidents. Moreover, it is crucial to ensure that implementers fully understand their roles and have the necessary commitment and skills to carry out this policy effectively.

However, while data integration was initially progressing well, several challenges began to emerge, especially after leadership changes at the relevant agencies. These changes led to a lack of continuity in policy implementation, causing the initially successful program to falter. Shifts in commitment between leaders and field staff exacerbated the situation, ultimately leading to policy stagnation. Additionally, the failure of this policy can also be attributed to inadequate coordination among the agencies responsible for its successful implementation. On the other hand, the community has responded positively to this policy.

The majority of the public has welcomed the integration of maritime safety and security data, viewing it as an innovation that will enhance safety and comfort during maritime journeys. The public also feels safer due to the certainty of passenger data that can be used to mitigate the risks of maritime accidents. This demonstrates that, despite facing internal challenges, the policy's continuity is still strongly supported by the community, which directly benefits from its implementation. For this policy to continue and develop in the future, a strong commitment from all parties is necessary, especially in terms of coordination among agencies and ensuring the sustainability of the policy, even with changes in leadership structure.

Strengthening institutional capacity and providing training systems for implementers are also key factors to ensure that this policy runs smoothly and delivers maximum benefits to the community. The image above illustrates the coordination framework among the agencies involved in the implementation of the policy for integrating safety and security data in the ferry terminal of ASDP Tanjung Uban. ASDP is responsible for managing passenger data, which is then transmitted digitally through a web-based system. BPTD processes this data into the Surat Perintah Berlayar (SPB), while the Tanjung Uban PLP Base plays a role in data transmission.

Coordination among these agencies is crucial to ensure effective data integration, with ASDP ensuring the proper management of passenger data, BPTD completing the issuance of the SPB, and PLP facilitating data transmission via the digital system. This coordination process is essential for the smooth implementation of the policy and more responsive oversight of maritime safety. Therefore, the coordination process among the

agencies involved in implementing the safety and security data integration policy at the ASDP Tanjung Uban Ferry Terminal is vital to ensure the smoothness and success of the system. Each agency has a specific role and provides mutual support throughout the process, which includes managing passenger data and ensuring maritime safety oversight.

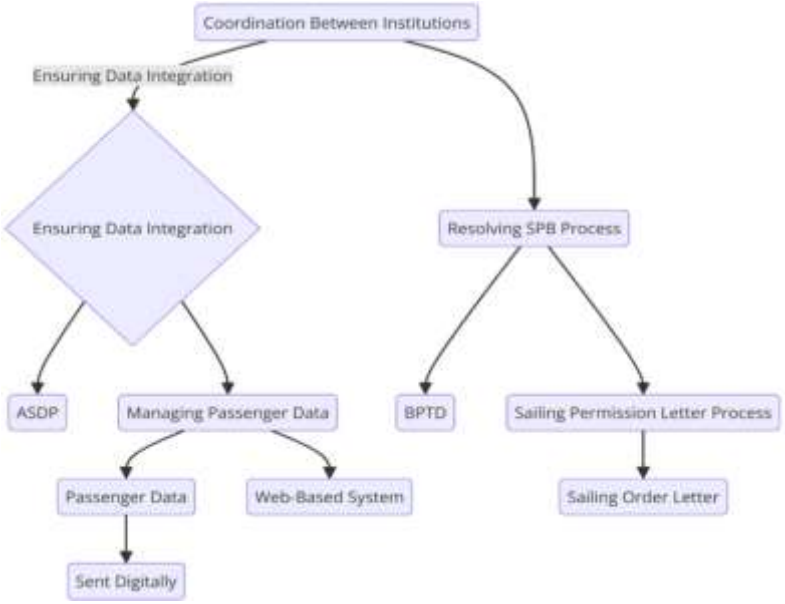

Figure 1. Coordination of Agencies in the Policy Implementation Process
(Source: Processed By Researchers, 2025)

3. Challenges and Obstacles in the Implementation of Data Integration Policy

In the implementation of the data integration policy at the Tanjung Uban port, several challenges and obstacles need to be addressed to ensure the smoothness and sustainability of the policy. First, one of the main challenges is the lack of coordination among the agencies involved in the data integration process. This issue arises because the previous system was manual-based, which caused poor connectivity of data between the parties involved, such as ASDP, the Port Authority (*Syahbandar*), BPTD, and the Tanjung Uban PLP Base. Additionally, the limited availability of skilled human resources (HR) to manage information technology systems also poses a significant constraint.

Many personnel are not yet trained in using web-based systems, which can hinder the efficient management and monitoring of data. For example, there are difficulties in integrating data from the *Surat Perintah Berlayar* (SPB), which links the number of crew members, passengers, and the ship's destination across different agencies. Furthermore, there are obstacles arising from changes in leadership at the agency level. Leadership transitions may result in a lack of continuity in policies, as there could be a shift in priorities or a lack of commitment to policies previously implemented. This can also reduce the effectiveness of policy implementation, as new leaders may not have a deep understanding of or may not carry forward the policy with the same enthusiasm.

Additionally, external factors such as rapid technological advancements present another challenge. While web-based systems have great potential for simplifying data exchange, their implementation is often hindered by existing infrastructure limitations and challenges in ensuring the system operates effectively amid fast-paced technological developments. Finally, discontinuity may also stem from disharmony within the units of the agencies involved. It is not uncommon for transfers and rotations of positions to cause a loss of consistency in policies, leading to the halting or suboptimal implementation of well-designed policies. Lack of transparency in processes and the absence of regular

evaluations of the policy further exacerbate the situation. Solutions to these challenges include enhancing HR training, improving technological infrastructure, and maintaining inter-agency commitment to ensure that the data integration policy can be implemented effectively and sustainably.

4. Impact of Web-Based Maritime Security Data Integration on Efficiency and Safety

In the context of implementing the policy for integrating safety and security data at the Tanjung Uban Ferry Port, this approach involves several key stakeholders, including ASDP, BPTD, and the Tanjung Uban PLP Base, which utilize a web-based system. The goal of this integration is to create a seamless data flow between these agencies, which is crucial for safety and operational effectiveness. This not only improves efficiency but also strengthens the capacity for rapid response in emergency situations. One significant impact of this policy implementation is the enhanced efficiency in managing passenger data, allowing all relevant parties to access information in real time.

With the digital system in place, the processes of data collection and sharing become more streamlined, reducing delays and errors often associated with manual data processing systems. However, despite the policy fostering stronger collaboration among the involved agencies, its implementation also faces challenges such as system compatibility and the training of human resources. According to interviews with key stakeholders, such as officials from ASDP and BPTD, this integration is crucial for improving operational safety in maritime transport. While there was initial resistance due to structural changes within the organizations, most stakeholders support the initiative as it provides more accurate data, contributing to quicker responses during maritime incidents.

An important additional benefit is the reduced risk of accidents, thanks to more accurate data and faster passenger manifest sharing between the relevant agencies. This integration also strengthens the maritime oversight framework by enabling better coordination among security forces, such as the Police, BASARNAS, and the Indonesian Navy (TNI AL), ensuring a more comprehensive security network. Overall, despite operational challenges that must be addressed, the web-based safety data integration at Tanjung Uban Port offers significant improvements in both operational efficiency and maritime safety. This policy aligns with broader national maritime security objectives and reflects the growing need for digital transformation in public safety systems.

5. The Role Of Stakeholders In The Success Of Maritime Security Data Integration

The role of stakeholders in the success of maritime security data integration is crucial as this policy involves various parties with responsibilities and authority in the maritime and shipping sectors. Each stakeholder has a specific role in ensuring the successful implementation of this policy. The following are the key roles of the involved stakeholders:

a. Government and Relevant Agencies (Ministry of Transportation, KPLP, BASARNAS, and others), The government, through relevant ministries such as the Ministry of Transportation and the Marine and Coastal Guard (KPLP), plays a supervisory and policymaking role in determining regulations and safety guidelines for maritime transport. These agencies ensure that the data integration policy is implemented correctly according to established standards, and they monitor its implementation on the ground. They are also responsible for providing the necessary resources and infrastructure to support this policy.

b. Port Operators (ASDP, Syahbandar, and Port Management), As the parties directly involved in port operations, port operators like ASDP and Syahbandar have a primary role in managing data related to vessels, passengers, and port conditions. They ensure that data collected from vessels, passenger manifests, and port conditions can be integrated with the existing maritime security system. They also play a role in ensuring that the data is easily accessible to relevant parties, such as security forces and government agencies.
c. Service Users (Passengers, Ship Operators), Maritime service users also play an important role, particularly in the collection and verification of data. Passengers are expected to provide accurate information regarding their identity and travel intentions. Additionally, ship operators are responsible for providing data related to departures, crew members, and other ship-related information necessary for the security system.
d. Security Authorities (Police, Indonesian Navy, BASARNAS), Security forces such as the Police, Indonesian Navy (TNI AL), and BASARNAS, play a critical role in overseeing and enforcing maritime security laws. With data integration, they can monitor vessel movements, passengers, and maritime conditions in real-time. In emergency situations, they can respond more quickly with accurate data, helping to reduce accident risks and improve maritime safety.
e. Developers and Information Technology (IT Teams and Web System Providers), Those responsible for developing and providing the IT for the web-based system play an important role in creating a platform that integrates data from various stakeholders. The IT teams are tasked with developing systems that are user-friendly, secure, reliable, and ensure that all parties can access and share data quickly and effectively.
f. The Public and Media, The public and the media also play a role in raising awareness about the importance of maritime safety. Through education and public campaigns, they can help strengthen public understanding of the policy and encourage adherence to established procedures. The media can also serve as a communication channel to provide information regarding maritime safety to the public.

The success of maritime security data integration heavily relies on effective collaboration among all stakeholders involved. Coordinating efficiently between the government, port operators, security forces, technology providers, and the public will create a more efficient and secure system. Each party must commit to sharing data transparently, ensuring information security, and providing adequate training and support to all parties involved. Overall, the integration of maritime security data cannot proceed without the active participation and cooperation of all stakeholders. Without the contribution of each party, achieving the goal of improved maritime safety and operational efficiency at the port will be difficult.

Conclusion

Based on the research findings, the implementation of the web-based maritime safety and security data integration policy at Tanjung Uban Port has shown significant results in improving coordination among the relevant agencies, operational efficiency, and maritime safety. The transition from a manual system to a web-based system has facilitated the exchange of data between the involved parties, such as ASDP, BPTD, Syahbandar, and the PLP Base. This has enabled more effective monitoring of passenger and vessel safety. Additionally, the use of web-based technology allows real-time data access, which accelerates decision-making processes in emergency situations and reduces the potential errors often found in manual systems. Thus, this policy has successfully enhanced the quality of maritime safety services, benefiting both service users and port managers.

However, despite the positive outcomes, the implementation of this policy faces considerable challenges, such as suboptimal coordination among the involved agencies, leadership changes that disrupt policy continuity, and the limited availability of human resources skilled in information technology. These constraints affect the effectiveness of the policy and need to be addressed by strengthening training for the personnel involved and ensuring continued commitment between agencies. Therefore, greater support from various parties, including the government, port operators, and the public, is necessary for this policy to continue developing and have a positive impact on improving safety and operational efficiency at Tanjung Uban Port.

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