Efficiency of Using Drones and Boats in Monitoring the Security of the Pang Pang Bay Water Aerodrome Area

Rangga Maulana[1], Untung Lestari Nur Wibowo[2], Demmy Setyo Wiyono[3], Dede Ardian[4]
[1234]Akademi Penerbang Indonesia Banyuwangi, Indonesia
Correspondent: untung.apib2020@gmail.com[1]

ABSTRACT: This research investigates the use of drones and boats in monitoring the security of the water aerodrome area in Pang-Pang Bay. The aim is to measure the efficiency of using these two tools, compare their performance results, and evaluate the implications of the research results for security and operational development in the region. This research integrates qualitative and quantitative approaches to understand the role and challenges of each tool.The research results show that the use of drones provides significant efficiency in quickly reaching the incident point, covering a wide area, and aerial views that are useful in routine monitoring. On the other hand, boats have the advantage of quick response in emergency situations, stability in bad weather, and the ability to provide immediate assistance to individuals on the water. The results of the comparative analysis between the use of drones and boats reflect the special advantages of each tool in various aspects.The implication of this research is that the development of a security surveillance strategy in Pang-Pang Bay must consider the wise use of both tools, depending on operational needs and weather conditions. In an ideal situation, the combined use of drones and boats can provide a comprehensive solution to maintaining water safety.This research also makes an important contribution to the technology's development and application in the context of security surveillance. In conclusion, this research provides an in-depth understanding of the use of drones and boats in monitoring the Pang-Pang Bay water aerodrome area and provides a strong foundation for the development of better and more effective surveillance strategies in the area.

Keywords: Drones, Boats, Security Surveillance, Water Aerodrome

INTRODUCTION

Development continues rapidly, particularly marked by rapid technological advances (Justice & Of, 2023), which have resulted in significant changes in the transportation and security industries (Kadarisman, 2017). This progress not only has an impact on conventional modes of

transfortation on land and air (Amir & Rahman, 2020) but also opens up new opportunities in the form of water aerodrome. The water aerodrome concept involves the use of water as a landing and take-off runway for seaplanes (Lyu et al., 2021). Pang-Pang Bay, with its wide waters and geographical potential, is a promising location for the development of a water aerodrome. However, the development of this kind of infrastructure is not free from challenges in terms of complex monitoring and security (Carr, 2016; Nameere-Kivunike et al., 2023; Poměnková & Malach, 2023; Stolka et al., 2018).

Safety is a crucial factor in water aerodrome operations (Xiao et al., 2020). Water areas that involve the use of aircraft and other aviation activities require an effective and efficient monitoring system (Zelenika et al., 2020). In an effort to meet these needs, technology has played a central role (Rukmana et al., 2023). One technology that is becoming increasingly prominent is the use of drones and boats in security surveillance operations (Butcher et al., 2021). Drones, as unmanned flying devices (Meiarti et al., 2019), provide advantages in reconnaissance from higher air (Triwahyu, Hardi, 2022), cover wide areas (Ikhsan et al., 2022), and are able to transmit data in real-time visuals (Irawan & Agus Sofwan, 2023). On the other hand, boats can provide flexibility in accessing areas of the water surface that are difficult to reach by drones (Hemingway-Foday et al., 2020; Sindato et al., 2021).

However, even though drones and boats have great potential, there has been no comprehensive study comparing the efficiency and advantages of each tool in the field of security surveillance at water aerodromes. Differences in performance, response time, area coverage, quality of data generated, and operational costs need to be analyzed in depth to identify the benefits of each option. Therefore, this research aims to bridge this knowledge gap by testing and comparing the efficiency of using drones and boats in monitoring security in the Pang-Pang Bay water aerodrome area. Not only that, operational security and safety in the water aerodrome area are also closely related to regulatory aspects and compliance with aviation security standards (Schweiger & Preis, 2022). Efficiency in supervision can have a direct impact on decision-making in managing risks and overcoming emergency situations (Kristina et al., 2022). Therefore, a deeper understanding of the potential of each monitoring tool can help develop better guidelines and protocols in diverse situations (Alsumayt et al., 2023; Alwateer et al., 2019; Behjati et al., 2021; King, 2014).

Apart from practical benefits in the field of security, this research also has theoretical implications in the field of technology and applications in the field of surveillance. The limitations inherent in the use of drones and boats can provide valuable insight into the development of future surveillance technologies. By understanding the advantages and limitations of each tool, you can formulate new innovations that combine the best aspects of these two technologies (Patriarca et al., 2023).

In increasingly connected global conditions, this research is also relevant to developments in the water aerodrome sector in various locations in the world. The results of this research can provide guidance for decision-making regarding the most effective use of monitoring tools in various geographic conditions and operational environments. This will help in building a solid security and operational foundation for future water aerodrome development (Argyrou et al., 2023; Pirotta et al., 2022).

By considering the complexity of security and technological challenges in water aerodrome development, this research has a broader goal than simply understanding surveillance tools. By bridging this knowledge gap, it is hoped that this research can make a significant contribution to the development of water aerodrome infrastructure as a whole. Thus, we can embrace a safer, more efficient, and sustainable transportation future through an optimal combination of drone technology and the use of boats in security surveillance operations at the Pang-Pang Bay water aerodrome area.

METHOD

Research methodology is a framework used to collect data and answer research questions that have been asked (Ardiansyah et al., 2023). In this study, a comparative approach will be applied to investigate and compare the efficiency of using drones and boats in carrying out security monitoring in the water aerodrome area in Pang-Pang Bay. This research will combine qualitative and quantitative approaches (Parjaman & Akhmad, 2019). Qualitative data will be obtained through direct visual observation and interviews with drone and boat operators. Quantitative data will be obtained through measuring response time efficiency, area coverage, and operational cost analysis.

This research will use a comparative research design that will compare the use of drones and boats in various aspects, such as response time efficiency, surveillance performance, and operational costs. The research location is in the water aerodrome area in Pang-Pang Bay, which was chosen because of its potential as a water aerodrome location and the importance of security monitoring in its operations. The independent variable in this research is the use of drones and boats as security surveillance tools, while the dependent variables include response time efficiency, surveillance performance (area coverage, data quality), and operational costs. Data collection was carried out using several techniques, including direct observation of drones in surveillance operations, visual documentation, interviews with operators, and analysis of visual data resulting from the use of drones (Komariah et al., 2022). For boats, data collection involved direct observation during boat patrols, interviews with boat crew, and recording of collected surveillance data. In addition, response time efficiency is measured from surveillance commands to effective response and drone and boat operational cost data are collected over a period of time.

Qualitative data will be analyzed using a qualitative approach (Siregar, 2021), including content analysis from interviews and observations. Quantitative data will be analyzed statistically using comparison methods to measure efficiency, speed, coverage, and operational costs between drones and boats. The validity of the research will be strengthened through data triangulation (Saniyyah et al., 2021), namely by comparing data from various sources, such as observations, interviews, and numerical data. Data reliability will be guaranteed by repeating measurements and involving analysis by other researchers to ensure consistent results (Widyastuti & Nugroho, 2018).

RESULT AND DISCUSSION

Drone Operators
The results of interviews with drone operators in security monitoring of the Pang-Pang Bay water aerodrome area provide an in-depth understanding of how drones have become an important element in surveillance operations. These operators are direct witnesses of significant changes in

surveillance technology and practices, and their views provide valuable insight.

The importance of efficiency in supervision was a key theme that emerged from these interviews. Drone operators consistently emphasize that drones bring high efficiency in monitoring water aerodrome areas. The drone operator explained that drones have the ability to quickly detect incident points, which is very important in emergency situations. In routine surveillance, drones allow drone Operators to easily cover large areas in a short time. This results in significant time savings and provides invaluable real-time insights to authorities.

However, nothing is perfect, and this interview also reveals some of the challenges drone operators face. One of the main challenges is weather limitations. Drones cannot operate in bad weather conditions, such as heavy rain or strong winds. This shows the need to have alternatives in situations where the use of drones becomes impossible. This limitation also reminds us that decisions about drone use must always consider changing weather factors.

Initial operational costs for drones are also an issue discussed. Drone operators need to face significant costs related to training, licensing, and special equipment. However, most drone operators see this as an investment that has the potential to provide long-term returns. Drone operators believe that drones bring long-term benefits in terms of operational efficiency and increased safety. Apart from the technical and operational aspects, there is also a psychological dimension to the use of drones. Some drone operators expressed that they face psychological discomfort when viewing potential dangers or incidents through the drone's eyes. This creates additional stress that operators need to deal with in their work. This underscores the importance of training and psychological preparation for drone operators.

In technological development, drones are currently equipped with advanced imaging capabilities, such as thermal cameras. This enables faster detection in dark or obscure conditions, which is a valuable asset in security surveillance. Operators feel that this technology helps them face complex challenges.

Another challenge is the limited flight duration. Drones have limited flight time before they must return to base for battery recharging. This requires good operational planning to maintain continuity of supervision. Careful regulation of drone flight time is important so that operations run smoothly.

Lastly, awareness of rules and regulations is an integral part of safe and legal drone operations. Drone operators are strongly committed to complying with applicable regulations and maintaining operations in accordance with legal requirements. This awareness indicates high professionalism and responsibility in the job.

From the results of this interview, it appears that the use of drones in monitoring the security of the Pang-Pang Bay water aerodrome is a significant development that brings many benefits, especially in terms of efficiency, fast response, and the ability to reach areas that are difficult to access. However, drone operators also face challenges such as weather limitations, high initial operational costs, and limited flight duration. Awareness of rules and regulations is also a key factor in maintaining safe and legally compliant drone operations. These findings provide a strong

foundation for the development of better security monitoring strategies in Pang-Pang Bay.

Figure 1. Drone Operator

Ship's crew

The results of interviews with boat crews who are experienced in monitoring the security of the Water Aerodrome area in Pang-Pang Bay reveal very valuable views and experience in the field of boat operations to maintain water security. This view provides in-depth insight into the important role and challenges faced by boats in carrying out monitoring duties.

One of the main points emphasized by the boat crew is the superiority of the boat in emergencies. The boat crew highlighted that the boat has the ability to respond quickly in emergency situations and provide immediate assistance to individuals in need of help. The speed of the boat and its ability to respond to emergency situations, such as rescue actions, are invaluable assets in maintaining security.

Figure 2. Boat Operator

Additionally, the stability of the boat in bad weather was also a significant theme in these interviews. The boat crew explained that the boat is more stable and can operate in less-than-ideal weather conditions, including bad weather with high waves and strong winds. This provides additional flexibility and reliability in carrying out surveillance tasks, especially in waters that often face difficult weather conditions.

However, there are also challenges faced by boat crews, including significant daily operational costs, such as fuel costs, maintenance, and routine maintenance. While boats have the advantage of reliability, these costs can be a burden in the long run.

The boat crew also stressed the importance of human interaction in monitoring. These crews consider the ability to communicate directly with individuals on the water and provide physical assistance to be an invaluable aspect of maintaining safety. Boats allow for close, direct human contact with individuals on the water, something that drones often cannot achieve.

Overall, the results of interviews with boat crews provide an in-depth understanding of the role and challenges faced by boats in monitoring security in Pang-Pang Bay. Excellence in emergency situations, stability in bad weather, and the ability to provide physical assistance are key components of this boat's role. Even though there are challenges such as daily operational costs, boats remain an irreplaceable asset in maintaining water safety. These findings provide a solid foundation for the development of better security surveillance strategies in Pang-Pang Bay, leveraging the strengths of each tool and addressing existing challenges.

Table 1. Comparison of Drones with Ships

Theme	Boat
Time Efficiency from preparation time – implementation (minutes)	± 240 (pp area)
Response Speed (minutes)	± 90
Coverage Area (hectares)	109 - 125
Operational Costs (Rp/year) **- Ship preparation** **- Fuel (BBM)** **- Ship maintenance** **- Ship steering services**	Rp 67.200.000

Theme	Drone
Time Efficiency from preparation time – implementation (minutes)	± 20 (pp)
Response Speed (minutes)	± 45
Coverage Area (hectares)	109 - 150
Operational Costs (Rp/year) - Battery charging - Maintenance	Rp 18.000.000

The data in this table are the average results of the measurements carried out in this research. This provides an overview of the comparative performance of drones and boats in water aerodrome security surveillance.

a. Time Efficiency: Drones take less time (average 20 minutes) to reach the intended location and return to the starting point compared to boats (average 240 minutes). If you use a boat, from first preparing the boat to reaching your destination takes around 2 hours. This process takes about 1 hour to prepare the boat and about 40-50 minutes journey from the water's edge to the Water Aerodrome location. This shows that drones have an advantage in response time efficiency.

b. Response Speed: Boats have a higher response speed (average 90 minutes) compared to drones (average 45 minutes), indicating that boats can respond to emergency situations in rescue. Meanwhile, drones respond more quickly in terms of surveillance.

c. Area Coverage: Drones are able to cover a larger area (average 109 - 150 hectares) compared to boats (average 109 - 125 hectares). This shows that drones have advantages in wide-area surveillance.

d. Operational Costs: Operational costs are an aspect to consider, and in this case, drone operations show lower costs compared to boat operations. In using drones, the average annual operational costs are around IDR 18,000,000, which includes costs such as battery charging and routine maintenance. Meanwhile, operating a boat requires an average annual cost of around IDR 67,200,000, which includes boat preparation, purchasing fuel, boat maintenance, and boat steering services. This shows that the use of drones has significant advantages in terms of operational cost efficiency.

Table 2. Combination of Use of Drones with Ships

Theme	Drone	Boat	Combination
Time Efficiency from preparation time – implementation (minutes)	± 20 (pp)	± 240 (pp area)	± 110 (PP focus area)
Response Speed (minutes)	± 45	± 90	± 60 (PP focus area)
Coverage Area (hectares)	109 - 150	109 - 125	109 - 150
Operational Costs (Rp/year)	Rp 67.200.000	Rp 18.000.000	Rp 43.200.000

The combination of using boats and drones in monitoring the security of the water aerodrome area in Pang-Pang Bay can produce time efficiency (± 110 minutes in the PP focus area), speed of response (± 60 minutes in the PP focus area), and wide visual area coverage (109 - 150 hectares). In this combination, drones provide fast response and a bird's eye view from above, while boats provide physical action in emergency situations.

In addition, using this combination can reduce operational costs significantly, with estimated annual operational costs of IDR 43,200,000. Drones have lower operational costs than boats. Thus, integrating boats and drones into security surveillance strategies can improve responsiveness and operational efficiency while reducing costs. This combination creates a more comprehensive and effective solution for maintaining the security of the water aerodrome area in Pang-Pang Bay.

Efficiency of Using Drones
The research findings confirm that drones make a significant contribution to increasing the operational

efficiency of security monitoring of the Pang-Pang Bay water aerodrome area. One of the main advantages of drones is their ability to reach the incident point very quickly. This is due to the mobility and speed that drones have in moving through the air.

Apart from that, drones also provide a broad view of the situation. With sophisticated imaging equipment, such as thermal cameras, drones can collect real-time data from quite high altitudes. This view provides a deep understanding of conditions on the ground, allowing officers to make the right decisions in a short time. The freedom of drones to cover areas that are difficult to access is an important aspect, especially in security surveillance involving large waters or remote areas.

Apart from the efficiency aspect, drones also bring benefits in the form of minimal risk for operators. Drone operations are carried out remotely, meaning that operators do not have to be physically in potentially dangerous locations. This provides additional safety and reduces the risk of injury or work accidents. The drone's ability to operate in the air also minimizes the risk of collision with objects on the water surface or other objects in the field.

In rapid response to emergency situations, drones have clear advantages. Drones can be launched very quickly and provide much-needed initial visibility in emergency situations such as spotting or searching for missing individuals. This can be the difference between life and death in many cases. However, it should be noted that although drones provide many advantages, they also have limitations. One significant limitation is the dependence on favorable weather conditions. Drones cannot operate effectively in bad weather such as heavy rain or strong winds. Therefore, decisions regarding the use of drones must always take into account changing weather factors. Overall, the efficiency of using drones in monitoring the Pang-Pang Bay water aerodrome area. Drones provide significant benefits in terms of fast response, area coverage, and minimal risk to operators.

Figure 3. Mavic 3 Basic Drone

Efficiency of Boat Use

One of the main advantages of using a boat is the quick response in emergency situations. The boats are equipped with equipment and personnel who are ready to respond to various types of emergencies on the water. Boats can provide immediate assistance to individuals in need of assistance, such as in the case of a rescue. The boat's ability to move on the surface of the water with high speed and stability is a valuable asset in situations like this. The speed and mobility of the boat allow it to get to the scene quickly, which can be the difference between safety and risk to life.

Apart from fast response in emergency situations, the stability of the boat in bad weather is also an important point in this discussion. The boat has the ability to operate in weather conditions that do not support the use of drones. For example, heavy rain or strong winds that might make it difficult for the drone to fly will not significantly affect the boat. This creates additional reliability in conducting surveillance operations, especially in areas frequently exposed to unstable weather.

However, as previously stated, no tool is perfect. The use of boats also has some limitations. One of them is the limitation in covering large areas quickly, as can be done by drones. Drones can provide a bird's eye view from a height in a short time, while boats may require more time to reach areas far from the operators' home base.

In a comparative analysis of the use of drones and boats, it becomes clear that they have different and complementary roles. Drones provide advantages in terms of fast response, wide area coverage, and aerial views that are very useful in routine monitoring. On the other hand, boats have advantages in emergency measures, speed, stability, and the ability to provide immediate assistance to individuals on the water.

Thus, the efficient use of drones and boats in monitoring the Pang-Pang Bay water aerodrome area must be based on operational needs, weather conditions, and available resources. A good decision will consider the advantages of each tool and minimize the challenges that may be encountered. The combination of the two can provide a comprehensive solution to maintaining water security.

Figure 4: Seaplane landing at Pang-Pang Bay Water Aerodrome

Comparison of Performance Results

This research also compares performance results between the use of drones and boats. In this analysis, several aspects are taken into consideration, including performance, response time, area coverage, quality of data generated, and operational costs.

The results show that drones have advantages in faster performance and wider area coverage, especially in routine monitoring. However, boats have the advantage of quickly responding to emergency situations and providing immediate assistance. The quality of data produced by drones is considered good, especially with advanced imaging technology such as thermal cameras. However, boats remain a reliable option in bad weather. In terms of operational costs, drones have high initial costs, while boats have daily operational costs related to fuel and maintenance.

CONCLUSION

In this research, the efficiency of using drones and boats in monitoring the Pang-Pang Bay water aerodrome area has been analyzed in depth. In an ideal situation, the use of both can provide maximum benefits in maintaining security and operations. However, decisions about use should always consider factors such as weather conditions, operational needs, and resource availability.

This research underlines the importance of developing a comprehensive and integrated surveillance strategy that utilizes the advantages of each tool to improve security and response to emergency situations in the Pang-Pang Bay water aerodrome area. By understanding the crucial role of each tool and combining them wisely, we can ensure that the water aerodrome area remains safe and operates effectively in all conditions.

REFERENCE

Alsumayt, A., El-Haggar, N., Amouri, L., Alfawaer, Z. M., & Aljameel, S. S. (2023). Smart Flood Detection with AI and Blockchain Integration in Saudi Arabia Using Drones. *Sensors*, *23*(11). https://doi.org/10.3390/s23115148

Alwateer, M., Loke, S. W., & Zuchowicz, A. M. (2019). Drone services: issues in drones for location-based services from human-drone interaction to information processing. *Journal of Location Based Services*, *13*(2), 94–127. https://doi.org/10.1080/17489725.2018.1564845

Argyrou, A., Agapiou, A., Papakonstantinou, A., & Alexakis, D. D. (2023). Comparison of Machine Learning Pixel-Based Classifiers for Detecting Archaeological Ceramics. *Drones*, *7*(9). https://doi.org/10.3390/drones7090578

Behjati, M., Mohd Noh, A. B., Alobaidy, H. A. H., Zulkifley, M. A., Nordin, R., & Abdullah, N. F. (2021). Lora communications as an enabler for internet of drones towards large-scale livestock monitoring in rural farms. *Sensors*, *21*(15). https://doi.org/10.3390/s21155044

Carr, R. (2016). Surveillance politics and local government: A national survey of federal funding for CCTV in Australia. *Security Journal*, *29*(4), 683–709. https://doi.org/10.1057/sj.2014.12

Hemingway-Foday, J. J., Ngoyi, B. F., Tunda, C., Stolka, K. B., Grimes, K. E. L., Lubula, L., Mossoko, M., Kebela, B. I., Brown, L. M., & Macdonald, P. D. M. (2020). Lessons Learned from Reinforcing Epidemiologic Surveillance during the 2017 Ebola Outbreak in the Likati District, Democratic Republic of the Congo. *Health Security*, *18*(S1), S81–S91. https://doi.org/10.1089/hs.2019.0065

King, L. M. (2014). Will drones revolutionise ecotourism? *Journal of Ecotourism*, *13*(1), 85–92. https://doi.org/10.1080/14724049.2014.948448

Nameere-Kivunike, F., Gamukama, E. A., Nakatumba-Nabende, J., Mutembesa, D., Tusubira, J. F., Nsumba, S., Omongo, C. A., & Namanya, G. (2023). Assessing the contribution of the Adhoc crop health surveillance tool on the food security and livelihoods of smallholder farmers in Uganda. *Electronic Journal of Information Systems in Developing Countries*, *89*(3). https://doi.org/10.1002/isd2.12249

Patriarca, R., Simone, F., & Di Gravio, G. (2023). Supporting weather forecasting performance management at aerodromes through anomaly detection and hierarchical clustering. *Expert Systems with Applications*, *213*. https://doi.org/10.1016/j.eswa.2022.119210

Pirotta, V., Hocking, D. P., Iggleden, J., & Harcourt, R. (2022). Drone Observations of Marine Life and Human–Wildlife Interactions off Sydney, Australia. *Drones*, *6*(3). https://doi.org/10.3390/drones6030075

Poměnková, J., & Malach, T. (2023). Optimized Classifier Learning for Face Recognition Performance Boost in Security and Surveillance Applications. *Sensors*, *23*(15). https://doi.org/10.3390/s23157012

Sindato, C., Mboera, L. E. G., Beda, E., Mwabukusi, M., & Karimuribo, E. D. (2021). Community

health workers and disease surveillance in tanzania: Promoting the use of mobile technologies in detecting and reporting health events. *Health Security*, *19*(1), 116–129. https://doi.org/10.1089/hs.2019.0096

Stolka, K. B., Ngoyi, B. F., Grimes, K. E. L., Hemingway-Foday, J. J., Lubula, L., Nzanzu Magazani, A., Bikuku, J., Mossoko, M., Manya Kitoto, L., Mpangi Bashilebo, S., Lufwa Maya, D., Kebela Ilunga, B., Rhea, S., & Macdonald, P. D. M. (2018). Assessing the Surveillance System for Priority Zoonotic Diseases in the Democratic Republic of the Congo, 2017. *Health Security*, *16*, S44–S53. https://doi.org/10.1089/hs.2018.0060

Amir, M., & Rahman, A. (2020). Analisis Dampak Transportasi Online Terhadap Transportasi Konvensional (Bentor) di Kota Makassar. *Jurnal Mirai Managemnt*, *5*(1), 313–329.

Ardiansyah, Risnita, & Jailani, M. S. (2023). Teknik Pengumpulan Data Dan Instrumen Penelitian Ilmiah Pendidikan Pada Pendekatan Kualitatif dan Kuantitatif. *Jurnal IHSAN : Jurnal Pendidikan Islam*, *1*(2), 1–9. https://doi.org/10.61104/ihsan.v1i2.57

Butcher, P. A., Colefax, A. P., Gorkin, R. A., Kajiura, S. M., López, N. A., Mourier, J., Purcell, C. R., Skomal, G. B., Tucker, J. P., Walsh, A. J., Williamson, J. E., & Raoult, V. (2021). The drone revolution of shark science: a review. *Drones*, *5*(1), 1–28. https://doi.org/10.3390/drones5010008

Ikhsan, M., Permana, I., Arif Pratama, R., Bayu Setiajit, S., & Sriyanto, S. (2022). Desain Dan Analisis Struktur Drone Berbahan Alumunium Untuk Pemantauan Melalui Jalur Udara Dengan Kriteria Defleksi. *Teknika STTKD: Jurnal Teknik, Elektronik, Engine*, *8*(1), 44–51. https://doi.org/10.56521/teknika.v8i1.594

Irawan, H. M., & Agus Sofwan. (2023). Rancang Bangun Sistem Pengiriman Paket Penerobos Kemacetan Berbasis Teknologi Drone. *Saintech*, *33*(1), 35–44.

Justice, P., & Of, J. (2023). Perjanjian Kerjasama Bilateral Antara Indonesia Dan China Dalam. *PAJOUL (Pakuan Justice Journal Of Law)*, *04*, 1–16.

Kadarisman, M. (2017). Kebijakan Keselamatan Dan Keamanan Maritim Dalam Menunjang Sistem Transportasi Laut. *Jurnal Manajemen Transportasi & Logistik (JMTRANSLOG)*, *4*(2), 177. https://doi.org/10.54324/j.mtl.v4i2.121

Komariah, U. N., Sarjito, A., & … (2022). Manajemen Produksi Pesawat Cn 235-220 Maritime Patrol Aircraft Di Pt Dirgantara Indonesia (Persero) Untuk Mendukung Operasi Patroli Maritim TNI Angkatan Laut. *Manajemen Pertahanan …*, *8*(1), 64–83. https://jurnalprodi.idu.ac.id/index.php/MP/article/view/1125%0Ahttps://jurnalprodi.idu.ac.id/index.php/MP/article/download/1125/944

Kristina, R., Rochman, A. S., Yusuf, M., Sediyanto, Bagho, K. L., Sutikno, Hafidah, A., Wedhasari, T., SUKWIKA, T., Saepudin, A., & Afriansyah. (2022). *Manajemen Risiko* (Issue Desember).

Lyu, J., Yang, R., & Huang, L. (2021). Structure Dynamic Response of Amphibious Aircraft Induced by Water-Taxiing. *International Journal of Aerospace Engineering*. https://doi.org/10.1155/2021/6104407

Meiarti, R., Seto, T., & Sartohadi, J. (2019). Uji Akurasi Hasil Teknologi Pesawat Udara Tanpa Awak (Unmanned Aerial Vehicle) Dalam Aplikasi Pemetaan Kebencanaan Kepesisiran. *Jurnal Geografi, Edukasi Dan Lingkungan (JGEL)*, *3*(1), 1. https://doi.org/10.29405/jgel.v3i1.2987

Parjaman, T., & Akhmad, D. (2019). Pendekatan Penelitian Kombinasi: Sebagai "Jalan Tengah" Atas Dikotomi Kuantitatif-Kualitatif. *Jurnal Moderat*, *5*(4), 530–548. https://jurnal.unigal.ac.id/index.php/moderat

Rukmana, A. Y., Supriandi, & Wirawan, R. (2023). Penggunaan Teknologi dalam Pendidikan: Analisis Literatur Mengenai Efektivitas dan Implementasi. *Jurnal Pendidikan West Science*, *1*(07), 460–472. https://doi.org/10.58812/jpdws.v1i07.541

Saniyyah, L., Setiawan, D., & Ismaya, E. A. (2021). Dampak Penggunaan Gadget terhadap Perilaku Sosial Anak di Desa Jekulo Kudus. *Edukatif: Jurnal Ilmu Pendidikan*, *3*(4), 2132–2140. https://edukatif.org/index.php/edukatif/article/view/1161

Schweiger, K., & Preis, L. (2022). Urban Air Mobility: Systematic Review of Scientific Publications and Regulations for Vertiport Design and Operations. *Drones*, *6*(7). https://doi.org/10.3390/drones6070179

Siregar, I. A. (2021). Analisis Dan Interpretasi Data Kuantitatif. *ALACRITY : Journal of Education*, *1*(2), 39–48. https://doi.org/10.52121/alacrity.v1i2.25

Triwahyu, Hardi, H. (2022). Konsep Hybrid Propultion System Pada Unmanned Aerial Vehicle Guna Meningkatkan Waktu Terbang Dalam Misi Pengintaian Udara. *E-Jurnal.Tni-Au.Mil.Id*, *1*(1), 33–42. e-jurnal.tni-au.mil.id

Widyastuti, D. A., & Nugroho, M. R. (2018). Efektivitas Tagline #DijaminOri Terhadap Brand Awarness E-Commerce JD.ID. *Journal of Entrepreneurship, Management, and Industry (JEMI)*, *1*(4), 1–15.

Xiao, Q., Luo, F., & Li, Y. (2020). Risk assessment of seaplane operation safety using Bayesian network. *Symmetry*, *12*(6), 1–20. https://doi.org/10.3390/SYM12060888

Zelenika, S., Hadas, Z., Bader, S., Becker, T., Gljušćić, P., Hlinka, J., Janak, L., Kamenar, E., Ksica, F., Kyratsi, T., Louca, L., Mrlik, M., Osmanović, A., Pakrashi, V., Rubes, O., Ševeček, O., Silva, J. P. B., Tofel, P., Trkulja, B., … Vrcan, Ž. (2020). Energy harvesting technologies for structural health monitoring of airplane components—a review. *Sensors (Switzerland)*, *20*(22), 1–57. https://doi.org/10.3390/s20226685