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The Importance Of Integrated LOCA Between Adjacent Units in Aerodrome

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***Abstract*— This journal discusses the importance of Letter Of Operational Coordination Agreement (LOCA) and the connection of LOCA between units in the implementation of aviation at Aerodrome. Aviation is a unified system consisting of the use of airspace, aircraft, Aerodromes, air transportation, flight navigation, safety and security, the environment, and other public facilities. To optimize and improve the quality, safety, and security of aviation operations, one way is to create synergy between units at the Aerodrome so that coordination and collaboration between units can be optimized. LOCA is one of the main supports for creating optimal flight operations. This research aims to harmonize the main tasks, functions, and authorities between units so that there are no similarities so that there is no overlap in authority which could have the potential to be bad in the implementation of flight operations at Aerodrome.**

Keywords—Integrated, LOCA, Safety Management System

I. INTRODUCTION

Aviation is an integrated system consisting of the utilization of airspace, aircraft, Aerodromes, air transportation, flight navigation, safety and security, environment, and other public facilities.[1]

Commercial aviation systems are increasingly stretched to their capacity while existing Safety Management Systems (SMS) do not live up to our expectations as higher efficiency standards are taxing human resources, higher competition levels are reducing the potential for collaboration and the sharing of risk data, and technological advances are making systems difficult to operate and re-design.[2]

The nation's economic structure heavily depends on air travel. In addition to transporting passengers and cargo on numerous domestic and international flight routes, civil aviation aircraft of both domestic and foreign airlines also handle mail delivery, emergency medical services, patrol oil and gas pipelines, ice work, aerial photography of the terrain, power line laying, and construction and installation tasks. As the primary gauge of the caliber of civil aviation operations, ensuring flight safety is one of the primary responsibilities of air transport providers. This duty is difficult since flight safety depends on the performance of all aviation transport system (ATS) components, including operated aircraft, flight and technical people, ground equipment, and personnel of air traffic control and flight support services.[3]

The earliest research can date back to 1972, that Edwards proposed the SHELL model to describe the four aspects of man, machine, environment, and management system affecting aviation safety. In the 1980s, the SHELL model was gradually extended to cockpit resource management (CRM), highlighting the pilot centered safety management thinking.[4]

Human factors have increasingly been the leading cause of aircraft accidents. In most cases, human factors are not working alone, instead they are coupled with complex environment, mechanical factors, physiological and psychological factors of pilots, and organizational management, all of which form a complex aviation safety system.[5]

Since 2000, system safety theory has gradually become a new direction in the field of aviation safety, comprehensively considering factors such as technology, human, organization, and the interactions between them, and emphasizing that a particular element alone cannot ensure the safety of the overall operation of systems. It is necessary to analyze the safety mechanism and solve the problems in safety management based on the law of system operations. The safety management system (SMS) is proposed to meet this demand from the perspective of system safety and risk management, which emphasizes the integrity and dynamics of the system to achieve dynamic feedback and prediction of system safety behavior.[6]

Research literature on SMS has been dominated by two interleaved strands. The first strand has focused on how theoretical perspectives, such as accident-related models, and organizational models can provide guidance for elaborating and developing certain SMS aspects of complex systems in isolation from other organizational processes.[7] The second strand has focused on how SMS can be best integrated with other management systems in an effort to deliver synergistic results, not only in safety, but also in productivity, quality and environment.[8]

In aviation to create synergies to improve air traffic services and aerodrome services as a support safety, a Letter of Operational Coordination Agreement (LOCA) was made which is a guideline for the implementation of operational coordination and is a complementary regulation that regulates more technically all the provisions that have been agreed upon.

While the writer was carrying out the Aerodrome Control Tower On the Job Training activities at Perum LPPNPI Batam Branch Office. Following the LOCA between Hang Nadim Batam Aerodrome and Perum LPPNPI Batam Branch Office, to ensure the safety of flight operations the Tower Unit Perum LPPNPI Batam Branch Office always coordinates with related units at Hang Nadim Batam Aerodrome, the Safety Unit is no exception.

The Safety Unit and the Tower Unit are directly related to the safety performance of Hang Nadim Batam Aerodrome. The two units have their respective main tasks and functions according to their respective fields so a system of coordination, and division of tasks and responsibilities is needed so that the safety of flight operations at the Aerodrome is under predetermined standards.

The Safety Unit is a unit formed to implement the Safety Management System at Hang Nadim Batam Aerodrome. Safety management system (SMS). Safety Management System is a systematic approach to managing safety, including the necessary organizational structures, accountability, responsibilities, policies, and procedures.[9]

Following Law Number 1 of 2009 concerning Aviation, it has been regulated that every aviation service provider that operates a certified Aerodrome is required to create, implement, evaluate, and continuously improve a Safety Management System. The implementation of this law is SKEP/223/X/2009 concerning Instructions and Procedures for Implementing an Aerodrome Operations Safety Management System, Section 139-01 (Advisory Circular 139-01, Aerodrome Safety Management system).[10]

So the Hang Nadim Batam Safety Unit was formed which has the responsibility of ensuring the safety of flight operations and as much as possible reducing the occurrence of accidents and incidents by socializing and training the personnel on duty. The Hang Nadim Batam Safety Unit has the main task of establishing Safety Performance Indicators following Hang Nadim Aerodrome SOP Number 1 of 2021 for Aerodrome operators consisting of:

1. Runway Incursion
   Runway Incursion is any illegal presence (without permission) on the runway, whether it is an aircraft, vehicle or person or animal which could potentially cause conflict with an aircraft that has been permitted to land and take off so that the aircraft experiences an incident/accident.[11]
2. Runway Excursion
   Runway Excursion is an event in which an aircraft veers off or overruns the runway surface either during take-off or landing.[12]
3. Ground Collision
   Ensure the safety of aircraft movement areas to prevent collisions between aircraft and between aircraft and obstructions on the apron.
4. Bird Strikes
   Handling, prevention, supervision, and control of Aviation Safety Disturbances (birdstike and wildlife hazards). Attacks that arise as a result of a collision between an airplane and a bird can result in a jet engine turbine being damaged by birds.[13] Great danger is represented by bird flights in the spring and autumn periods, i.e. when there is an intensive migration of birds. More than 80% of all collisions with birds occur at an altitude of up to 500 meters. As a rule, small aircraft fly at such altitudes, using the airspace when carrying passengers, performing aviation work, sanitary flights, etc. The speed of most aircraft (airplanes, helicopters) flying at low, extremely low altitudes is 200-500km / hour. the impact force of a bird the size of a seagull, a crow at a speed of 300-320 km / h is about 32000kg, at a speed of about 950 km / h is more than 28,000 kg. Therefore, a flying bird can easily pierce the fuselage lining, destroy the blades of the main engine fan input devices, damage the glazing of the aircraft, etc.[3]
5. Damage to aircraft caused by FOD
   FOD (Foreign Object Debris) is a foreign object or hazardous material in the runway, taxiway, and apron area that has the potential to pose a hazard to aircraft safety and operations.[14] FOD is common risk for aviation industry since long time ago and it has contributed to many terrible incidents and fatalities. The cost of FOD cases every year is very high, which is around RM 1.2 billion.[15]
6. KKOP (Aviation Operations Safety Zone)
   Monitor obstacles in KKOP following applicable regulations and immediately provide information on all objects (objects) whose height passes through the Flight Operations Safety Area (KKOP) in detail regarding the location and height and presence of obstructions, dangerous conditions, or any incidents at or near the Aerodrome which could affect flight safety.[16]
7. Safety Risk Management
   Safety Risk Identification which includes possible risks and risk severity. Identification, Assessment, Mitigation, Evaluation, and Monitoring. From these results, the Safety Unit made a Hazard Identification Risk Assessment (HIRA).[9]

In the Main Tasks of the Safety Unit, there are similarities between the LOCA that applies to several Units at Hang Nadim Batam Aerodrome, and the Tower Unit of Perum LPPNPI Batam Branch Office, including the Aviation Security Unit and the Runway Unit. Similarities in Main Duties and Functions of Other Units at the Aerodrome

Aerodrome Safety Unit :

1. One of the Main Duties and Functions of the Aviation Security Unit under the LOCA between the Aviation Security Unit and the Tower Unit of Perum LPPNPI Batam Branch Office is to ensure that no animals are wandering around in the limited security area and airside areas.[17] Following SKEP/42/III/ 2010 concerning Instructions and Procedures for Civil Aviation Safety Regulations section 139-03 Wild Animal Danger Management at Aerodromes and their surroundings.[13]
2. One of the main tasks and functions of the runway unit under the LOCA between the Runway Unit and the Tower Unit is: Checking the condition and function of airside facilities including runways, taxiways, and aprons as well as supporting facilities.[18]
3. Following the Basic Duties and Functions of the Runway Unit, the Tower Unit is responsible for Notifying the Ground Unit if there is a report of FOD or damage to airside facilities that could endanger flight operations

While the writer was carrying out the Aerodrome Control Tower On the Job Training activities at Perum LPPNPI Batam Branch Office, the writer found problems related to the absence of LOCA between the Safety Unit BUBU Hang Nadim Batam and the Tower Unit Perum LPPNPI Batam Branch Office. In order to:

1. Provide aviation safety services that are safe, orderly , and efficient;
2. As a guideline for the implementation of inter-unit coordination procedures;
3. Explain the division of authority, duties, and responsibilities of each unit;
4. To avoid overlapping authority between units.

Therefore the LOCA between the Hang Nadim Batam Aerodrome Safety Unit and the Tower Unit of the Perum LPPNPI Batam Branch Office is urgently needed, and it is deemed necessary to carry out a review or review regarding the LOCA between the Tower Unit and the Aviation Security Unit and the Platform Unit which are considered not by the documents provided. applies to either party.

II. METHODOLOGY

The research method that the author uses is descriptive qualitative. The descriptive qualitative research method is a research approach used to understand the problem in a deep way in determining the research problem or topic to be studied. The problem of this research is related to overlapping authority between units caused by LOCA that has not been updated and integrated between units at Hang Nadim Batam Aerodrome.

Researchers collected data through interviews, observations, document studies, and ATC daily logbook records. This method of collection allows researchers to gain in-depth insight into existing problems. The data collected was analyzed qualitatively by identifying the relationship between units at Hang Nadim Batam Aerodrome through examples of cases that have occurred and existing LOCAs as well as units that do not yet have LOCAs related to similarities in basic tasks and functions, which results in overlapping authorities between units in the Aerodrome.

III. RESULT AND DISCUSSION

Based on the problems that the author faced when carrying out On The Job Training Aerodrome Control Tower at Perum LPPNPI Batam Branch Office, related to the absence of a Letter of Operational Coordination Agreement between the Hang Nadim Aerodrome Safety Unit Batam and the Tower Unit of Perum LPPNPI Batam Branch Office, which was deemed necessary to achieve this. :

1. Safe, orderly, and efficient aviation safety services at Hang Nadim Batam Aerodrome
2. Implementation of coordination procedures between units smoothly and efficiently at Hang Nadim Batam Aerodrome
3. There is no overlap in authority between units at Hang Nadim Batam Aerodrome

In the problems that the author describes, there are proposals for short-term and long-term problem-solving that the author can suggest, including:

Short Term Settlement

a. A special meeting was held between the Hang Nadim Batam Aerodrome Business Entity and Perum LPPNPI to discuss the status of LOCA for each party and decide on an agreement on the Main Duties and Functions related Main Duties and Functions of the BUBU Safety Unit which also included in the Main Duties and Functions of the Unit Others are following LOCA with the Tower Unit of Perum LPPNPI Batam Branch Office.
b. Disseminate minutes of the meeting to ATC personnel to serve as a temporary legal basis for carrying out tasks related to handling related problems, until the LOCA in question is available.

Long Term Settlement

a. A LOCA was created between the Hang Nadim Batam Aerodrome Safety Unit and the Perum LPPNPI Tower Unit, Batam Branch Office, based on the most updated and current documents.
b. Changes or amendments were made to the LOCA between the Tower Unit of Perum LPPNPI Batam Branch Office with the Aviation Security Unit and the Landasan Unit, and adjusted to the Main Duties and Functions of the BUBU Hang Nadim Batam Safety Unit.

The following are the proposed points that the author proposes to include in the LOCA between the BUBU Safety Unit and the Tower Unit of Perum LPPNPI Batam Branch Office:

Aerodrome Safety Unit :

a. Provide recommendations to the Tower Unit regarding potential dangers in the Aerodrome Area;
b. Provide input regarding non-standard findings found during patrols or inspections of the Tower Unit;
c. Provide safety guarantees for flight operations by the Main Duties and Functions of the Safety Unit.

Authority of Perum Tower Unit LPPNPI Batam Branch Office:

a. Receiving recommendations from the BUBU Safety Unit regarding potential dangers in the Aerodrome Area;
b. Receive input regarding non-standard findings found by the Safety Unit during patrols or inspections;
c. Follow up on reports received from the Safety Unit according to procedures.

Responsibilities of the Aerodrome Safety Unit:

a. Ensure control of the movement of people, vehicles, equipment, animals or other things entering the movement area;
b. Monitoring obstacles in KKOP under applicable regulations;
c. Promptly convey detailed information on all objects (objects) whose height passes through the Flight Operations Safety Area (KKOP) to the Tower Unit regarding the location and height as well as the existence of obstructing objects, dangerous conditions or any events at or near the Aerodrome that could affect flight safety;
d. Handling, preventing, supervising, and controlling Aviation Safety Disturbances (birdstike and wildlife hazards);
e. Ensure that no work materials can become FOD which endangers the safety of flight operations;

f. Submit a letter requesting the issuance of a NOTAM regarding any disturbance to flight safety.
g. Ensuring the safety of Aerodrome flight operations by reducing accidents and incidents using outreach and training of personnel.

Responsibilities of the LPPNPI Perum Tower Unit:
a. Inform the Safety Unit when it becomes aware of any movement of people, vehicles, equipment, animals or anything else entering the Movement Area;
b. Delivering reports received from the Pilot to the Safety Unit regarding matters that could endanger the safety of flight operations in the movement area;
c. Receive obstacle data whose height passes through the Flight Operations Safety Area (KKOP) from the First Party regarding the location and altitude and the presence of obstructions, dangerous conditions or any incidents at or near the Aerodrome that could affect flight safety;
d. Convey information on obstacles that affect flight safety to the Safety Unit;
e. Receiving and conveying to Safety Unit information related to flight safety disturbances (birdstike and wildlife hazards);
f. Receive information from the Safety Unit regarding handling, prevention, supervision, and control of Aviation Safety Disturbances (birdstike and wildlife hazards);
g. Provide input to the Safety Unit regarding handling, prevention, monitoring, and control of Bird Strikes and Wildlife Hazards;

In recording the ATC Daily Log Book report on February 19th 2022, the Aerodrome Safety Unit carried out FOD inspections on the runway, taxiway, and apron. Following Hang Nadim Batam Aerodrome SOP Number 1 of 2021, handling FOD is one of the main duties and functions of the Safety Unit, however, by the LOCA between the Landing Unit and the Tower Unit, handling FOD problems in the movement area is the responsibility of the Landing Unit. In handling this problem under LOCA between the Foundation Unit and the Tower Unit.

There is potential for overlapping authority regarding FOD handling between the Aerodrome Safety Unit and the Runway Unit because there are similarities in the Main Duties and Functions between the Aerodrome Safety Unit and the Runway Unit.

In recording the ATC Daily Log Book report dated March 7th 2022 regarding handling wildlife hazards in the movement area, there was a Safety Unit with the Aviation Security Unit involved. Following Hang Nadim Batam Aerodrome SOP Number 1 of 2021, handling wildlife hazards is the main task and function of the Aerodrome Safety Unit, however, based on the LOCA between the Aviation Security Unit and the Tower Unit, handling wildlife hazards is the responsibility of the Aviation Security Unit. In handling wildlife hazards, the Tower Unit must inform the Aviation Security Unit regarding the existence of wildlife hazards by the applicable LOCA.

In this case example, there may be potential for overlapping authority or miscommunication regarding handling wildlife hazards between the Aerodrome Safety Unit and the Aviation Security Unit, this is because there are similarities in the Main Duties and Functions between the Aerodrome Safety Unit and the Aviation Security Unit.

Following PM 65 of 2017 Civil Aviation Safety Regulations Part 170 (Civil Aviation Safety Regulation Part 170) concerning Air Traffic Rules section 2.4. Coordination between the Air Traffic Services Unit and the Aerodrome management unit. The Air Traffic Services Unit is required to have a Letter of Operational Coordination Agreement (LOCA) with the Aerodrome management unit to ensure that the Aerodrome Control Tower and Approach Control Unit obtain the most up-to-date information about significant conditions occurring. occur in the movement area, including the presence of temporary hazards, as well as the operational status conditions of the facilities at the aerodrome.[10]

The purpose and objective of making an Operational Memorandum of Understanding is to serve as a guideline for the implementation of coordination procedures between the Safety Unit Hang Nadim Batam Aerodrome and the Tower Unit Perum LPPNPI Batam Branch Office and the aim is to provide safe, orderly and efficient aviation safety services at Hang Nadim Batam Aerodrome. To improve aviation security and safety services at Hang Nadim Batam Aerodrome, especially the air and landside areas, it is deemed necessary to make standard rules governing operations in the area.

The following are several journals that discuss safety management systems at Aerodromes and also the importance of evaluating accidents or incidents to improve the safety of flight operations. Correspondence between system elements and generic processes of coordination are important parts of building up an Integrated Management System (IMS), but integration can be even more ambitious regarding the internal embeddedness and the external interactions with stakeholders. In order to secure continuous improvements of performance, to bring about competitive advantage as well as to move towards sustainable development, then IMS has to be embedded throughout the organization and in all stakeholder relations. The preconditions for this level of integration seem to be: A shared understanding of internal and external challenges; A learning organization and a culture of responsibility; and Interactions with stakeholders.[19]

The goal for integration is to connect, coordinate, and combine safety and security management activities in order to exploit synergies and to resolve conflicts between them. Tools refer also to the functional level, i.e., how different functions of safety and security management could be combined. Examples include risk identification, risk assessment, incident reporting, and emergency management. Furthermore, practical guidelines regarding IMSS were created during this study.[20]

The functional integration refers to the integration of core functions or coordination of generic processes, such as safety- and security management systems. The deepest level of integration is cultural integration, which refers to the embeddedness of an integrated management of safety and security in a culture of learning and continuous improvement.[19]

However, coordination and better integration of safety and security would be relevant for a better understanding and preparation for systemic risks and their management.[20]

IV. CONCLUSION

Letter of Operational Coordination Agreement (LOCA) is one of the supports for implementing aviation safety and

aviation security as well as orderly operational services between units at the Aerodrome. Therefore, it is recommended that the two units make a LOCA as stipulated in PM 65 of 2017 Civil Aviation Safety Regulation Part 170 concerning Air Traffic Rules.

In aviation to create synergies to improve air traffic services and aerodrome services as a support safety, a LOCA was made which is a guideline for the implementation of operational coordination and is a complementary regulation that regulates more technically all the provisions that have been agreed upon.

REFERENCES

[1] Kemendephub, "Undang-Undang No. 1 Tentang Penerbangan," no. 2, p. 196, 2009.

[2] S. Malakis, T. Kontogiannis, and A. Smoker, "A pragmatic approach to the limitations of safety management systems in aviation," 2023. https://www.sciencedirect.com/science/article/abs/pii/S0925753523001571 (accessed Dec. 24, 2023).

[3] R. Akzigitov, E. Kuznetsov, V. Musonov, and A. Timokhovich, "Ensuring the Safety of Aircraft Flights in Ornithological Terms," *Transp. Res. Procedia*, vol. 68, pp. 566–572, 2022, doi: 10.1016/j.trpro.2023.02.077.

[4] D. Muñoz-Marrón, "Human factors in aviation: CRM (crew resource management)," *Papeles del Psicol.*, vol. 39, no. 3, pp. 191–199, 2018, doi: 10.23923/pap.psicol2018.2870.

[5] Y. Wu, S. Zhang, X. Zhang, Y. Lu, and Z. Xiong, "Analysis on coupling dynamic effect of human errors in aviation safety," 2023, doi: https://doi.org/10.1016/j.aap.2023.107277.

[6] C. L. Anderson, M. D. Aguiar, D. Truong, M. A. Friend, J. Williams, and M. T. Dickson, "Development of a risk indicator score card for a large, flight training department," *Saf. Sci.*, vol. 131, no. January, p. 104899, 2020, doi: 10.1016/j.ssci.2020.104899.

[7] U. Khalid, A. Sagoo, and M. Benachir, "Safety Management System (SMS) framework development – Mitigating the critical safety factors affecting Health and Safety performance in construction projects," *Saf. Sci.*, vol. 143, no. November 2020, p. 105402, 2021, doi: 10.1016/j.ssci.2021.105402.

[8] E. Stefana, F. Ustolin, and N. Paltrinieri, "IMPROSafety: A risk-based framework to integrate occupational and process safety," *J. Loss Prev. Process Ind.*, vol. 75, no. November 2021, p. 104698, 2022, doi: 10.1016/j.jlp.2021.104698.

[9] ICAO, *Annex 19 - Safety Management. Montreal: Internacional Civil Aviation Organization*, no. November. 2016. [Online]. Available: https://www.icao.int/safety/safetymanagement/Pages/default.aspx

[10] P. Keselamatan and P. Sipil, "diubah terakhir dengan Peraturan Menteri Perhubungan Penerbangan Sipil Bagian 173 (Civil Aviation Safety Penerbangan Sipil Bagian 175 (Civil Aviation Safety," pp. 1–65, 2017.

[11] S. Edition, *Doc 4444*, no. November. 2016.

[12] D. File, "ADVISORY CIRCULAR," no. June, 2023.

[13] K. Perhubungan, D. Jenderal, and P. Udara, "Advisory circular casr part 139-08, aerodrome manual)," 2010.

[14] Federal Aviation Administration (FAA), "Advisory Circular: Airport Foreign Object Debris (FOD) Management," *Foreign Object Debris Manag.*, vol. 150/5210, no. 24, 2010.

[15] R. Hussin, N. Ismail, and S. Mustapa, "A study of foreign object damage (FOD) and prevention method at the airport and aircraft maintenance area," *IOP Conf. Ser. Mater. Sci. Eng.*, vol. 152, no. 1, 2016, doi: 10.1088/1757-899X/152/1/012038.

[16] M. Perhubungan and R. Indonesia, "Menteri perhubungan republik indonesia," 2020.

[17] N. K. Operasional, L. Penyelenggara, P. Navigasi, P. Indonesia, and K. Distrik, "Letter of Operational Coordination Agreement Tower - AVSEC," 2015.

[18] N. K. Operasional, L. Penyelenggara, P. Navigasi, P. Indonesia, and K. Distrik, "LOCA UNIT TOWER - UNIT LANDASAN 2018.pdf." 2018.

[19] T. H. Jørgensen, A. Remmen, and M. D. Mellado, "Integrated management systems - Three different levels of integration," *J. Clean. Prod.*, vol. 14, no. 8, pp. 713–722, 2006, doi: 10.1016/j.jclepro.2005.04.005.

[20] A. Tugnoli *et al.*, "Integrated management of safety and security in Seveso sites - sociotechnical perspectives," vol. 151, no. March, 2022, doi: 10.1016/j.ssci.2022.105741.