

# The Effect of Delay in Changing Slot Time on Electronic Flight Progress Strips on Air Traffic Services

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**Abstract**— Along with the increasing amount of traffic at I Gusti Ngurah Rai International Airport, the quality of Air Traffic Control services at PERUM LPPNPI Denpasar must be improved. This research uses the descriptive qualitative method as a reference in this research. In this research, it is found that pilots often request ATC clearance, start-up clearance or pushback clearance not in accordance with the applicable slot time, either too early or past the limit of the aircraft's slot time itself (expired), so the Clearance Delivery Unit must contact the ATS-RO to update the slot time on the FPS of the aircraft. This can hamper the process of guiding flight traffic in the Tower unit. Therefore, the author offers a solution, one of which is the procurement of an alerting system that is integrated between the ATFM unit and the ATS RO unit.

**Keywords**— Air Traffic Controller, Air Traffic Services, Airport, Slot Time, ATFM, EOBT

## I. INTRODUCTION

Along with the development of traffic at Ngurah Rai International Airport Bali in 2022 which on average reaches 150 traffic movements per day, the quality of flight navigation services must also be improved, especially in the jurisdiction area of the Aerodrome Control Tower of I Gusti Ngurah Rai International Airport.

Based on document 4444 on air traffic services, the functions of an aerodrome control tower can be performed by various control or working positions, namely:

- aerodrome supervisors, who are normally responsible for operations on runways and aircraft flying within the area of responsibility of the aerodrome control tower;
- ground supervisors, who are usually responsible for traffic in maneuvering areas with the exception of runways;
- Clearance Delivery position, usually responsible for the delivery of start-up clearance and ATC clearance for departure from IFR flights.[1]

At I Gusti Ngurah Rai International Airport there is a clearance delivery position where this unit is responsible for ensuring all aircraft that will depart have a flight plan (FPL) in accordance with the valid slot time, providing relevant information related to aerodrome conditions, weather and other flight information related to the flight plan, and providing ATC clearance in accordance with the flight plan (FPL). Start-up and pushback clearance is given with the provisions of 15 minutes before EOBT and 15

minutes after EOBT, giving ATC Clearance to the aircraft with the provisions of at least 20 minutes before EOBT.[2]

During the author On the Job Training Aerodrome Control Tower activities, the author found problems related to slot time, according to PM 57 of 2016 Chapter II Article 2, "Every aircraft movement at the airport obtains slot time approval (slot clearance)".[3] Therefore, pilots often request ATC clearance, start-up clearance or pushback clearance not in accordance with the applicable slot time, either too early or past the limit of the aircraft slot time itself (expired), so the Clearance Delivery Unit must contact the ATS-RO to update the slot time on the FPS of the aircraft.



Fig 1. Slot expired



Fig 2. slot expired



Fig 3. Early slot



Fig 4. Early slot

Then the impact on the aviator is that the aviator must contact the operator of the airline of each aircraft, which in such conditions takes up to several minutes. In addition, it can also add to the workload of the Clearance Delivery unit which, if traffic conditions are congested, can hamper communication between the tower and the aircraft. So that it can hamper the purpose of air traffic services at point 3, namely "expedite and maintain an orderly flow of air traffic" or "accelerate and smooth the flow of flight traffic". Because of the frequent occurrence of the above problems, it is necessary to have a solution to these problems in order to achieve the smooth and orderly flow



of flight traffic.

There is research on the use of EOBT at Soekarno Hatta airport, but the research aims to find out the target of take-off time for each aircraft that will take off. At Soekarno-Hatta Airport, because it only uses EOBT for aircraft reference before making a pushback, it is considered unable to solve or parse the increasing traffic density at Soekarno Hatta Airport.[4]

There are also journals about the lack of coordination between related units so that slot time changes often occur without notifying other parties which have an impact on the suboptimal provision of flight traffic guidance services.[5]

In a journal entitled "Flight Delay Prediction Based on Aviation Big Data and Machine Learning" Air Traffic Flow Management techniques are considered very suitable for predicting delayed flights and if maximized can reduce the possibility of delay in a flight.[6]

However, this research aims to see the cause of the frequent lack of updated slot time information on the electronic flight progress strip used by Air Traffic Controllers to see the information needed as a reference for aircraft when going to pushback so that ATC must reconfirm the latest slot time to the relevant units which can increase the workload of an ATC. The system used by ATC such as automation should be able to reduce the workload of ATC but in its implementation it is considered less than optimal at Perum LPPNPI Denpasar Branch.[7]

## II. METHODOLOGY

The qualitative descriptive method is a qualitative research approach used to describe and understand certain phenomena or events in a descriptive and in-depth manner. This method is often used in social research, education, health sciences, and various other fields when researchers want to explain phenomena in detail without trying to develop complex theories or conceptual models.[8], [9]

The qualitative descriptive method is useful when researchers want to understand in depth a phenomenon or event, without the need to develop complex theories or test specific hypotheses. It can also be used in the context of exploratory research or when the researcher wants to compile an in-depth report on a particular phenomenon for the purpose of further information or understanding. [10], [11]

this research adopts a descriptive qualitative approach, which is employed to investigate research inquiries by gathering narratives derived from interviews, observations, and document analysis. throughout the author's 106-day stay at the research location, meticulous observations and data collection were conducted to support the research objectives. this data took various forms, including:

- documentation of traffic encountering expired slots.
- documentation of traffic encountering early slots.
- gathering information through interviews conducted by the author with key stakeholders, particularly ats-ro perum lppnpi denpasar branch.

on february 27, 2022, the author conducted interviews and collected information at the Denpasar branch ats-ro perum LPPNPI unit. the gathered information is pivotal to addressing the challenges outlined in this study. ensuring

the precision of specifications this approach allowed the research to delve deeply into the subject matter, providing a comprehensive understanding of the issues at hand.[12]

## III. RESULT

Based on the problems that the author faces related to the delay in updating the slot time of the Flight Progress Strip of an aircraft, which can cause an increase in the workload of a controller, it is necessary to evaluate this in order to deal with the increasing movement of traffic at I Gusti Ngurah Rai International Airport.

The problem of late slot time updates on FPS is caused by the absence of notification on the Chronos system if there is an aircraft experiencing a delay or early slot, so that ATS RO personnel must manually check the slot time of the aircraft in question to then update the slot contained in the FPS which is directly connected to the ATC system in the control tower. This causes frequent delays in providing information related to slot time to the Aerodrome Control Tower unit. In order to achieve the goal of aviation traffic services point 3 "expedite and maintain an orderly flow of air traffic". [13], this research offers a solution among others:

- Provision of a warning system in the Chronos application when there is a slot time change made by the ATFM unit.



With the warning system in the chronos application, it is expected that when the ATFM unit changes the slot time on a flight, the ATS-RO unit can see directly that the slot time on the flight has changed and can be immediately followed up by the ATS-RO unit to immediately change the flight slot time on the FPS contained in the ATC System which is directly connected to the ATC System located on the control tower, so as to minimize the workload carried out by the controller.

- LOCA socialization between ATFM ATS RO & TOWER ATS RO

Letter of Coordination Agreement (LoCA) socialization is an important step in ensuring effectiveness and compliance with coordination agreements in various contexts, including in the aviation industry. Here are some of the reasons why LoCA socialization is so important:

**Shared Understanding:** Socialization helps all parties involved in the agreement to clearly understand the

contents and objectives of the LoCA. This includes parties such as airlines, airports, air traffic service providers, and aviation authorities. With a

common understanding, they can avoid confusion and misunderstandings that can disrupt operations.

**Compliance and Safety:** Ensuring all parties comply with LOCA requirements is key to maintaining flight safety. Socialization helps emphasize the importance of adhering to agreed safety rules and procedures.

**Error Avoidance:** In some cases, mistakes in the interpretation or implementation of LOCA can have serious consequences. Socialization helps reduce the risk of mistakes by explaining in detail how the agreement should be executed and what should be avoided.

Regular socialization related to the duties and functions of each unit contained in the LOCA must be carried out so that every point agreed by the two parties contained in the LOCA can be guided and implemented out so that every point agreed by the two parties contained in the LOCA can be guided and implemented by each unit member.

### 3. Performance Evaluation of the Units Involved

Team performance evaluation is an important component of managing teams and the organization as a whole. First, team performance evaluations help improve productivity by identifying strengths and weaknesses within the team. With a better understanding of team performance, leaders and team members can work together to identify and address areas for improvement, thereby increasing team efficiency and output.

Second, team performance evaluations support better decision-making. The data and information obtained through evaluation helps team leaders and management make more informed and evidence-based strategic decisions. With a deep understanding of team performance, organizations can allocate resources more intelligently, design appropriate strategies, and respond better to environmental changes.

Third, team performance evaluation also promotes the development of team members and their professional development. Through the feedback provided in the evaluation, team members can identify areas where they can improve their skills and contributions. This promotes individual growth and strengthens the team as a whole, creating an environment conducive to continuous development. Thus, team performance evaluation has very important implications in achieving success and sustainable growth in an organizational context.

By scheduling unit performance evaluations, it is hoped that each unit can provide suggestions and input to other units so that deficiencies in each unit can be found solutions so that an efficient communication to other units so that deficiencies in

each unit can be found solutions so that an

efficient communication system can be achieved between related units system an be achieved between related units in order to achieve progress in flight navigationservices in order to achieve progress in flight navigation services in Indonesia.

## IV. DISCUSSION

On February 27, 2022, the author extracted information at the ATS-RO unit of PERUM LPPNPI Denpasar Branch. This is supported by a journal that says that interviews for research needs only focus on extracting information on one side only.[12]. The author provides information related to problems that are often experienced by the author when carrying out field practice, namely, frequent delays in updating slot time on the Flight Progress Strip of an aircraft. According to information from sources, the mechanism for informing slot time to the ATC System located in the tower is carried out in a flow:

- a) The airlines contact ATFM to get the slot time of the related aircraft
- b) The ATFM provides slot time to the ATS-RO unit through the CHRONOS application.
- c) The ATS-RO provides slot time data obtained from the ATFM unit into the FPS in the ATC System which is directly connected to the ATC System in the control tower.

There is a journal that discusses alerting or warnings systems and their correlation to flight traffic guidance, stating that alerting or warning systems are very important for logging traffic guidance. It is proven to be able to help an ATC in making faster decisions and of course can reduce the potential for human error in every decision. If alerting or warning systems are applied to the ATC system to coordinate, of course this can greatly help the process of coordination between units better and reduce the occurrence of human error in coordinating between units.[13]

Then, there is a journal about the importance of socializing a rule or regulation to the wider community to prevent misunderstanding or ignorance of the regulations that apply in an environment that has special rules for something that is beneficial to flight safety. Based on this study, it is important for an ANSP to always provide an understanding to its employees about the agreement between one unit and another (LOCA).[14] Each unit must fully understand the contents of the agreement contained in a LOCA. Each unit must also obey and submit to the LOCA so that an agreement can run properly and can facilitate the coordination process between its units.

Last, ut not least is the importance of evaluating each program. Program evaluation is present to provide input, review and consideration in determining whether the program is worth continuing or stopping.[15] According to Wirawan said that: "evaluation as research to collect, analyze, and present useful information about the object of evaluation, assess it and compare it with evaluation indicators and the results are used to make decisions about the object of evaluation" [16], therefore,

the solution to the problem that the author offers will be very appropriate if carried out, considering that after carrying out each point contained in the local, it is necessary to evaluate it to see whether the activity is running smoothly or the activity is not running smoothly, and then find a solution to achieve better performance between related units.

## V. CONCLUSION

An ATC must be guided by five objectives of air traffic services. The third guideline is, "Expedite and maintain the orderly flow of air traffic." In relation to these guidelines we must provide the best service to aircraft in providing the most efficient flow of air traffic. The purpose of Air Traffic Flow Management services document 9426 on ATS Planning Manual (First Edition) 1984 explains in the first point that is to keep the air traffic controller (Air Traffic Controller) does not experience overload work (over load) by limiting the existing capacity. So it is hoped that the initial model of an early warning system related to flight slot time can reduce the load of communication which is one of the workloads experienced by the controller and the provision of flight traffic services at Perum LPPNPI Denpasar Branch becomes more efficient, accurate, and leading.

With the problems described above, to solve these problems, the authors suggest the following:

1. Provision of a warning system in the Chronos application when there is a change in slot time made by the ATFM unit.
2. Optimization of LOCA between ATFM-ATS RO & TOWER-ATS RO.
3. Performance Evaluation Meeting of the Units Involved

With the solutions that the author mentions, the hope is that they can be realized in order to create safe, efficient and orderly flight traffic services.

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