

Review of Inter-Unit Communication Tools for the Provision of Air Traffic Services

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Abstract— This paper discusses the challenges faced by the Tarakan Approach unit in providing optimal flight traffic control services. The unit grapples with an excessive number of communication tools, leading to coordination issues, decreased concentration, and communication disruptions. The paper highlights the importance of Voice Control Communication System (VCCS) equipment as a solution to streamline communication and reduce workload. It also emphasizes the significance of regular maintenance and awareness among controllers and assistant controllers. By addressing these challenges, the Tarakan Approach unit aims to increase the efficiency and safety of its flight traffic services, ensuring smoother and more regular traffic flow in its airspace.

Keywords—Tarakan Approach, Flight Traffic Control, Communication Tools, VCCS, Coordination, Workload, Maintenance, Aviation Safety.

I. INTRODUCTION

The approach control unit is a unit established to provide air traffic control service to controlled flights arriving at, or departing from one or more aerodromes. Approach control service refers to air traffic control service for arriving or departing controlled flights [1].

An important task that has become the responsibility of an air traffic controller is to realize the 5 objectives of air traffic services, especially for point number 4. “provide advice and information useful for the safe and efficient conduct of flights” [2]. ATC must provide safe, orderly, and efficient services [3]. To achieve aviation safety where safety requirements are met in the use of airspace, aircraft, airports, air transportation, flight navigation, as well as supporting facilities and other public facilities [4].

In carrying out traffic guidance, coordination is an important part of the contracting procedure that needs to be implemented. Coordination shall be effected with any adjacent ATC unit or control sector, when required, to avoid conflict with the traffic under the jurisdiction of that unit or sector [1]. In organizations there are various kinds of work so coordination is needed so that these activities can run well [5]. Coordination is to create good arrangements to avoid danger and cause interference with normal flight [3].

A controlled flight shall be under the control of only one air traffic control unit at any given time. Responsibility for the control of all aircraft operating within a given block of airspace shall be vested in a single air traffic control unit. However, control of an aircraft or groups of aircraft may be delegated to other air traffic control units provided that

coordination between all air traffic control units concerned is assured [2]. Each division in the organization will get certain tasks that must be completed [5].

Therefore, apart from communicating with pilots, an air traffic controller must coordinate with other adjunction units to provide and obtain new, real-time information and instructions for optimal piloting. Air Traffic Controllers are required to work professionally in providing instructions and information to pilots [6]. To be able to support good coordination also needs the latest technology and gathering so that the performance of an air traffic controller can run well.

Juwata Tarakan International Airport is one of the airports in North Kalimantan province. In addition to serving domestic flights, Juwata Tarakan Airport also serves international flights. In North Kalimantan, many pioneer airports connect Tarakan with the hinterland around Tarakan.

Based on Aeronautical Information Publication (AIP), “Tarakan Approach has a fairly wide airspace area, covering 100 NM from “TRK” VOR/DME with the extension of Tarakan Corridor Traffic from “BRZ” VOR/DME up to MABOT points so that Tarakan Approach has an airspace area of up to 182.5 NM from “TRK” VOR/DME. Some airports within the Tarakan Approach airspace include Seluwing (Malinau), Nunukan, Kalimantan (Tanjung Redeb), and Tanjung Harapan (Tanjung Selor) airports.”



Fig. 1. Tarakan Approach

Tarakan Approach has a fairly dense amount of traffic, around 50-70 traffic per day, of which 20-30 traffic is overflying traffic, so the traffic movement in the Tarakan Approach air space becomes quite complex.

With traffic conditions that are quite dense and complex, providing flight traffic services in addition to requiring qualified and reliable flight traffic controllers to carry out their duties to regulate/guide the flow of flight traffic that is safe,



fast, and efficient must also be supported by adequate facilities and infrastructure and environmental conditions in the control room that can support work controller so that the provision of flight traffic services can be provided optimally.

The Tarakan Approach unit has 5 communication tools used to coordinate, namely:

- 1 unit of PABX telephone connected to Tower, ARO, GM, Manager, Security, Admin, and Technician units;
- 1 unit of direct speech telephone connected to Ujung Pandang ACC, Balikpapan APP, Kalimantan Tower, Malinau Tower, Long Bawan Info, Long Apung Info;
- 1 PSTN unit connected to Balikpapan Info, Meteorology unit, Nunukan Info, Tanjung Selor Info, Samarinda Tower, Gorontalo APP, ACC Ujung West. In addition, this PSTN phone is also a backup of direct speech phones;
- 1 unit of PANASONIC brand cellular phone as a backup of direct speech phones, and PSTN phones;
- 1 unit of smartphone used as a backup of cellular phones, direct speech, and PSTN.



Fig. 2. Tarakan Approach Communication Tool

In providing aviation traffic services, The number of Air Traffic Controllers is inadequate, resulting in obstacles and disruptions, such as increasing workloads and causing stress, fatigue, and decreased response and concentration [7]. Therefore the Controller is assisted by an assistant controller, one of whose duties is to coordinate with other adjacent units related to the smooth running of their duties. The number of communication tools that exist is often disturbing, especially during peak hours. Thus increasing the workload when coordinating.

When traffic conditions are heavy, there are several traffic conflicts at the same time. Some of the traffic conflicts that existed on December 5, 2022, were:

- 1) Batik 6674 rute Jakarta- Tarakan FL350 ETA 05.41 X
TMG 330 rute Jakarta – Tarakan FL330, ETA 05.37 X
PKSNK rute Long Apung – Tarakan A110 ETA 05.50
X SJV 695 rute Tarakan – Balikpapan FL280 ETD 05.26
X PKSNM rute Long Bawan – Tarakan A095 ETA
05.43 X WON 2361 rute Kalimantan – Balikpapan FL140
ETA 06.18;
- 2) Other Traffic:
 - SQS 8371 rute Long Bawan – Nunukan A 090
ETA 06.20;
 - WON 1365 rute Kalimantan – Balikpapan FL160
ETA 06.03;

- PKPAP rute Tarakan – Long Bawan A105 ETA 05.42;
- HA5224 rute Tarakan – Malinau A015 ETA 05.19.



Fig. 3. Tarakan Approach Traffic

There are obstacles in providing flight traffic services at Tarakan Approach optimally due to the performance problems of communication facilities, namely The Tarakan Approach unit has too many communication tools, and sometimes not all of them function properly, due to intermittent signal interference or reception, and the unavailability of VCCS (Voice Control Communication System) equipment.

Voice Communication Control System (VCCS) is a device designed to facilitate users voice communication by integrating all users (clients) and means of communication in one system and controlled using a control panel [8].



Fig. 4. VCCS Tool

In addition, integrated VCCS can coordinate air-to-ground communication equipment (VHF ADC, VHF APP, VHF ER, VHF Emergency) VCCS can be connected with special headphones that can help communication and controller coordination become easier and more flexible.



Fig. 5. Headphone VHF

The benefit of using VCCS is that when the user conducts flight communication it becomes easy because all frequencies and telephones are combined in a VCU (Voice Control Unit) so that the ATC desk control/work desk is not filled with communication devices. In addition, the VCCS client control

panel uses a touchscreen system to facilitate its use. When an airport does not have VCCS, it takes a lot of telephone lines and VHF A/G needed to communicate with the aircraft [8].

The consequences arising from the workload of coordination are as follows:

- The number of communication devices in the Tarakan Approach unit coupled with the condition of the room that is not yet soundproof, and the Tarakan Approach radio frequency that cannot reach the entire Tarakan airspace area when the telephone sounds simultaneously can cause interference with concentration while working so that the workload of the Controller and assistant increases which can interfere with the process of providing flight traffic services optimally;
- Related to point a, the above conditions can contribute to the occurrence of BOC and even BOS due to disruption of the hear back and readback process because the controller has difficulty listening to the pilot report/readback, and the pilot cannot receive controller instructions correctly. By SE.8 of 2022 concerning Readback Obligations for Clearances and Instructions of Aviation Traffic Control Officers aimed at preventing accidents and improving air transportation by minimizing the risk of aircraft proximity in a flight;
- Miscommunication, There can be a misunderstanding between the Controller and the Pilot because the instructions or clearance given are not well received;
- Load of communication, There is a load of communication because the Controller must repeat the instructions or clearances given because the Pilot cannot receive instructions or clearances properly, it's the one of workload. The workload of air traffic controllers is one of the factors that greatly influences the work stress of air traffic controller personnel [9].;
- There is a delay when giving releases or instructions to the related ATS unit, because it is constrained by the repetition of instructions and information by the Controller or assistant or because it is difficult to connect to the ATS of the related unit. So that it increases the workload when coordinating, and can result in the non-creation of one of the five objectives of ATS, namely smoothing and maintaining the regularity of flight traffic flow. With the amount of traffic getting denser, this obstacle can have an impact on the safety, smoothness, efficiency, and regularity of flight traffic flow.



Fig. 6. Condition Desk Control Tarakan Approach

II. METHODOLOGY

This type of research is descriptive qualitative, namely a technique that describes and interprets the meaning of the data that has been collected by paying attention to and recording as many aspects of the situation being studied at that time as possible, to obtain a general and comprehensive picture of the actual situation. using the descriptive method means that the researcher analyzes the data collected in the form of words, pictures, and not numbers. This data may come from interview scripts, field notes, photos, video tapes, personal documents, notes or memos, and other official documents [10]. To guarantee the results of the validity of the data obtained, three stages are required, better known as the basic foundation, namely; The first is variation where statistics work with changing circumstances. Both reductions mean that not all the information must be processed. Not all people have to be studied (population), but only representative samples are sufficient. Third, generalization, namely drawing general conclusions that apply to members of the population based on representative samples [11].

III. RESULT

From the problems the author experienced, the author tried to provide several alternative solutions to the problem, as follows:

- 1) Carrying out increased checks and maintenance of the quality of communication equipment at Perum LPPNPI Tarakan Branch, with more maintenance it is hoped that the quality of communication equipment can be maximized, because in supporting the provision of aviation traffic services, the performance of communication facilities is very important, and must be under normal circumstances in this case it can be used without failure for a certain period [12].
- 2) Procurement of supporting facilities and communication equipment, in this case, VCCS equipment because communication tools can be combined into one. By using VCCS, communication can be coordinated well because it uses a queuing system, so it does not disturb concentration and reduces the workload of the controller and assistant

controller when coordinating with related adjacent units. makes it easier for Air Traffic Controllers to communicate with connected parts of the airport [13].

- 3) Controllers and assistant controllers increase awareness regarding conditions that can disrupt concentration when providing flight traffic guidance services.
- 4) Controllers and assistant controllers improve coordination and communication with pilots and related adjacent units so that flight traffic services can continue to be provided optimally. Coordination with air traffic services is very important for air traffic services [14].

IV. DISCUSSION

The data obtained by the author in this matter is supported by one of the Decrees of the Director General of Civil Aviation Number: SKEP / 157 / IX / 03 concerning Guidelines for Maintenance and Reporting of Aviation Electronics and Electrical Facility Equipment. Perform increased inspection and maintenance of existing communications equipment, with the expectation that more frequent maintenance improvements will optimize the quality of communications equipment. This is very important to support aviation traffic services, where the performance of communication facilities must remain optimal and not fail in certain periods [12].

Furthermore, there is a journal that discusses the importance of VCCS needed in an airport. The importance of the existence of VCCS in an airport is to facilitate ATC and the parts within the airport that are connected in communicating. When an airport does not have VCCS, it takes a lot of telephone lines and VHF A/G needed to communicate with airplanes [15].

Furthermore, a journal discusses the importance of concentration needed by ATC in providing air traffic guidance. Concentration in controlling aircraft must remain optimal and does not pose a risk to safe and safe navigation services to pilots. Understanding ATC employee's related stress is an effort to recognize themselves and the mental burden face so that they can take appropriate coping steps to overcome stress due to work, and become a valuable contribution to minimizing the risk of human error [16].

Other journals say that in organizations there are various kinds of work so coordination is needed so that these activities can take place properly [5]. This is important because, in the world of aviation, there needs to be good coordination between controllers and assistant controllers and with other related units, to launch an ATC's obligation in serving guidance.

V. CONCLUSION

There are obstacles in providing optimal flight traffic control services due to the workload of coordination caused by the Tarakan Approach unit having too many communication tools, and sometimes not all of them function properly, due to signal/network interference which results in telephone reception when coordinating. intermittent, and no VCCS (Voice Control Communication System) equipment is available.

The number of existing communication tools is often a nuisance, especially during peak hours, thus increasing the workload when coordinating, and when the telephone rings simultaneously it can cause concentration problems when the controller provides air traffic control services, and the workload increases because sometimes the controller or the assistant controller experiences difficulties when contacting the related adjacent unit resulting in a delay when giving releases or instructions, and loads of communication occur because they have to repeat instructions or information to be given to the related adjacent unit.

With the solutions that the authors provide, hopefully, in the future, it will reduce the level of workload obtained by Tarakan Approach personnel and can facilitate future performance.

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