

Analysis of Aerodrome Tower Controller's Obstructed Visibility Due to Vertical Support (Pillar) in the Tower Cabin of Perum LPPNPI Branch in Medan

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Abstract— Tower controllers are air traffic control officers responsible for managing air traffic around airports to ensure safety, security, and efficiency in aircraft movements. They work in airport control towers, which serve as the central hub for air traffic control in the vicinity of the airport. Control towers are typically located near the runways and provide good visibility for monitoring aircraft movements on the ground and in the air. Within the control tower, the equipment and comfort of the air traffic controllers are important considerations. This research focuses on the control tower of Perum LPPNPI branch in Medan, where it has been found that wide-diameter pillars obstruct the view of the tower controllers. The aim of this study is to analyze the pillars as an obstruction and provide recommendations to Perum LPPNPI branch in Medan on how to address this issue. The research methodology employed is qualitative. The research findings conclude that the pillars indeed pose an obstruction, and the author suggests that Perum LPPNPI branch in Medan relocate the control desk.

Keywords— Tower controller, Vertical support, Air traffic services.

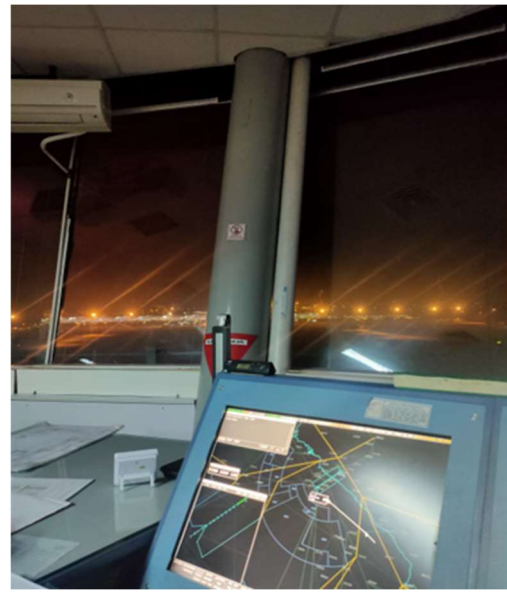
I. INTRODUCTION

Reported from the AirNav Indonesia website (2018) [1], prior to the enactment of Indonesian Law Number 1 of 2009 (UU Number 1, 2009) [2] concerning Indonesian's Aviation and Government Regulation (PP) Number 77 of 2012 [3] concerning State-Owned Enterprises (Perum) of the Indonesian Air Navigation Service Provider (LPPNPI), the management of the air navigation system was handled by PT Angkasa Pura I (Persero), PT Angkasa Pura II (Persero), and the Ministry of

Transportation, which managed Technical Implementation Units airports (bandara UPT) throughout Indonesia. To enhance air navigation services, the government aimed to establish a single navigation service management agency. In this regard, AirNav Indonesia was established, as a single management institution that merged the tasks previously carried out by PT Angkasa Pura I (Persero) and PT Angkasa Pura II (Persero). AirNav Indonesia is responsible not only for managing ground sectors such as airports but also for air navigation management. In 2009, a Draft Government Regulation (Rancangan Peraturan Pemerintah (RPP)) was prepared as the legal basis for the establishment of Perum LPPNPI. On September 13, 2012, President Susilo Bambang Yudhoyono enacted the RPP into Government Regulations (Peraturan Pemerintah (PP)) 77 of 2012 concerning Perum LPPNPI. This PP became the legal foundation for the establishment of Perum LPPNPI, better known as AirNav Indonesia. Following the issuance of PP 77 of 2012, the air navigation services previously managed by PT Angkasa Pura I (Persero) and PT Angkasa Pura II (Persero) as well as Technical Implementation Units were transferred to AirNav Indonesia. On January 16, 2013, at 22:00 WIB (Western Indonesian Time), all navigation services, human resources, and equipment that were previously managed by PT Angkasa Pura I (Persero) and PT Angkasa Pura II (Persero) were officially transferred to AirNav Indonesia.

With the establishment of AirNav Indonesia, it was expected that aviation safety and navigation services could be carried out more effectively. Previously, navigation services in Indonesia were served by several agencies, resulting in disparities in service quality and a lack of focus on the provision of air navigation services. The purpose of establishing Perum LPPNPI, as stated in PP No. 77 of 2012, is to provide air navigation services in accordance with applicable standards, with the aim of achieving national and international flight efficiency and effectiveness. As a Business Entity, the performance of AirNav Indonesia is assessed based on safety factors, including elements such as human resources, equipment, and procedures that must comply with developments and standards set forth in the Civil Aviation Safety Regulations (CASR) [4].

Perum LPPNPI branch in Medan is one of the branches of AirNav Indonesia, with the aim of enhancing flight safety and efficiency in the North Sumatra region and its surroundings. The Medan branch of Perum LPPNPI is responsible for air traffic control in the area, including at Kualanamu International Airport. Quoting from Annex 11 – Air Traffic Services (2018) [5], there are three units that provide ATC services. The first unit is the Aerodrome Control Tower (TWR), which offers air traffic control service, flight information service, and alerting service for aircraft operating or present in the vicinity of the airport, such as during takeoff, landing, taxiing, and in the maneuvering area, which is conducted in the control tower. The second unit is the Approach Control Office/Unit (APP), which provides air traffic control service, flight information service, and alerting service for aircraft in the airspace around the airport, both during approach and departure. The third unit is the Area Control Centre (ACC), which offers air traffic control service, flight information service, and alerting service for pilots flying in the en-route flight phase, especially controlled flights within controlled airspace. Inside the Aerodrome Control Tower of Perum LPPNPI branch in Medan, there are three units: Ground Movement Controller, Aerodrome Tower Controller, and Assistant. The Ground Movement Controller guides traffic in the movement area (Apron, Taxiway, and Runway), while the Aerodrome Tower Controller guides traffic in the maneuvering area (Taxiway, Runway, and its surroundings). In the structure of the control tower, there are large-diameter vertical support pillars supporting the roof of the tower cabin. This results in obstructed visibility for the Aerodrome Tower Controller, where these pillars hinder the view towards the apron (especially Apron Whiskey) and also obstruct the controller's view to parking stands 28-32 and 15. Based on this issue, the author raises the title "**Analysis of Aerodrome Tower Controller's Obstructed Visibility due to Vertical Support (Pillar) in the Tower Cabin of Perum LPPNPI branch in Medan**" in this paper.



Picture of The appearance of pillars obstructing the view towards the apron [6]

In the above picture, it can be seen that there are large pillars obstructing the controller's view. It should be noted that at the Kualanamu airport's aerodrome control tower, there is no A-SMGCS (Advanced Surface Movement Guidance and Control System), so the tower controller must maintain continuous watch, always monitoring the movement of aircraft and/or vehicles in the movement area. Due to these pillars, the controller needs to exert a little more effort to monitor the movement of aircraft entering or exiting the apron to ensure clear visibility.

II. LITERATURE REVIEW

Several specific requirements for operational purposes in the aerodrome control tower are explained in ICAO Doc. 9426 Air Traffic Services Planning Manual: Section 2 – Facilities Required by ATS; Chapter 2 – Specific Requirements for an Aerodrome Control Tower (1984) [7]:

1. 2.1.4 Vertical supports for the cabin roof should be kept to the smallest feasible diameter so as to minimize their obstruction of the controller's view. In the tower construction, the supporting pillars for the cabin roof should ideally be made with the smallest possible diameter to minimize their obstruction to the tower controller's view.
2. 2.1.6 The layout of working positions within the tower cab and the consequential arrangement of operating consoles will obviously be determined by the location of the tower in relation to the maneuvering area, and more especially, the approach direction which is most frequently used at the aerodrome in question. It is also explained that the positioning of working positions or control desks within the tower cabin is arranged based on the location of the maneuvering area and, if applicable, the approach direction most commonly used at that particular airport.

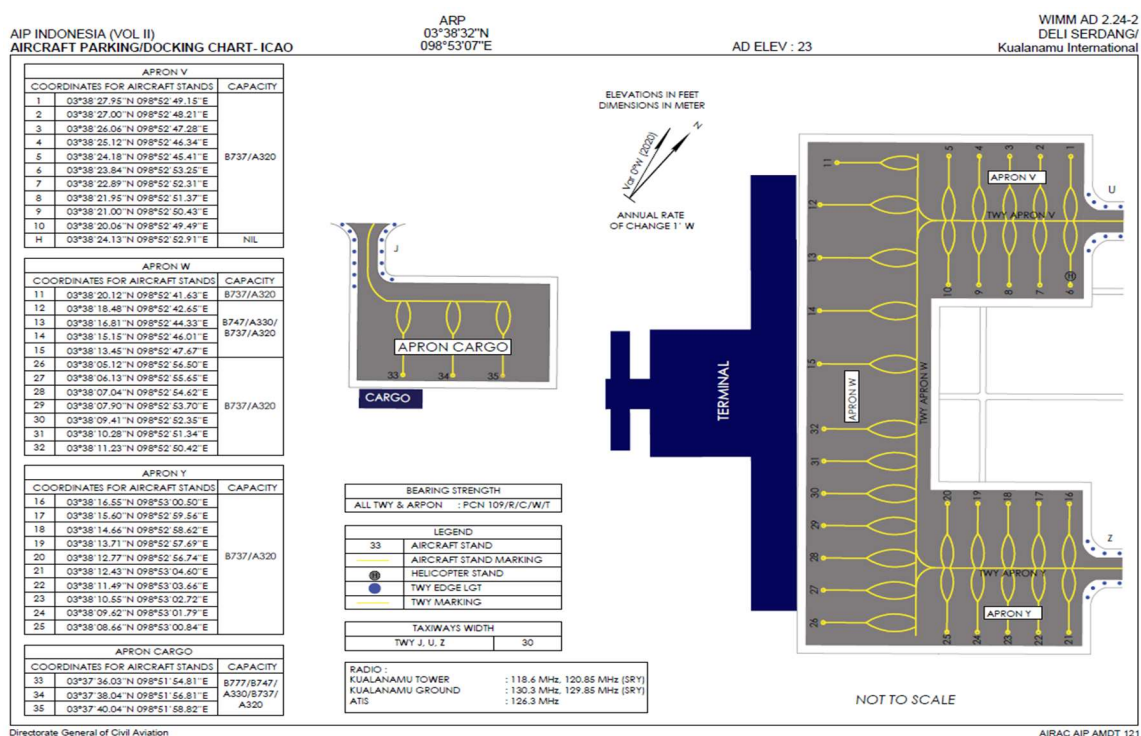
III. RESEARCH METHODS

In this study, the researcher employed a qualitative research method. Qualitative research is a type of research that focuses on obtaining an in-depth understanding of social reality by collecting data in the form of words, actions, or symbols, which are interpreted subjectively (Sarwono, 2018) [8]. According to Sugiyono (2018), qualitative research involves gathering data in the form of words, pictures, or sounds from research participants, which are then analyzed in-depth to understand the phenomena being studied. Arikunto (2017) [9] explains that the population in research refers to the entire subject of the study. The author identified the population in this study as the ATC personnel of Perum LPPNPI, Medan branch. Sugiyono (2018) explains that in qualitative research, the term "sample" is not referred to as "respondents" but rather as "informants" or "sources of information." The samples in qualitative research are not called "statistical samples" but rather "theoretical samples." According to Handayani (2020) [10], sampling is the process of selecting a number of elements from the population being studied to become the sample,

with an understanding of various characteristics or traits of the subjects that constitute the sample, allowing for generalization to the population elements. The author used the snowball sampling technique within the nonprobability sampling. The snowball sampling technique is a method of data source selection where the number of initial sources is small and then expands by seeking additional informants to obtain adequate data (Sugiyono, 2018). The instrument used in this qualitative research is the author themselves (Sugiyono, 2018). The author employed data collection techniques through unstructured observation, unstructured interviews, and literature study.

IV. ANALYSIS AND DISCUSSION

In this study, the author conducted interviews with several ATC personnel. The author asked whether the pillars that were the object of this research were a hindrance or problem for the controllers, and most of them revealed that the pillars were indeed a hindrance. These pillars have a large diameter, obstructing the controllers' view. The most disturbing aspect is that the pillars block the view towards the apron (especially Apron Whiskey) and also obstruct the view of parking stands 28-32 and 15.

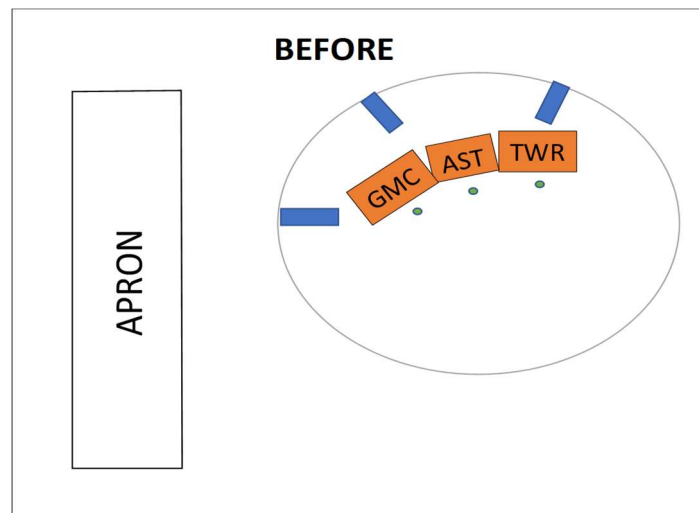


Picture of Kuala Lumpur Airport's Aircraft Parking / Docking Chart [11]

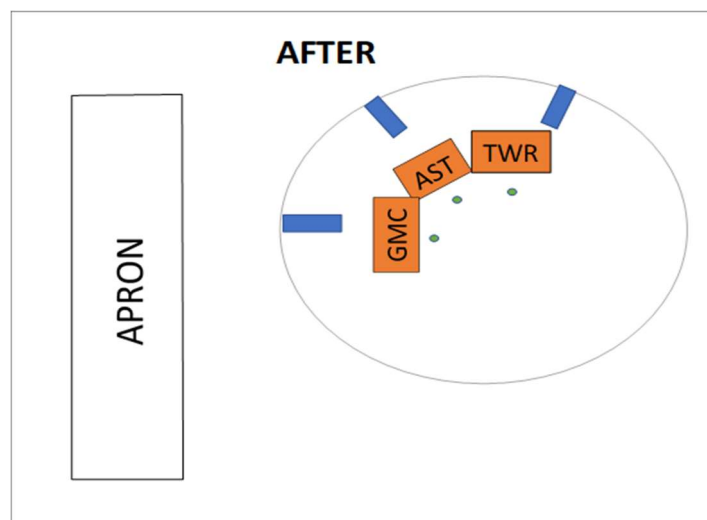
At Kuala Lumpur Aerodrome Control Tower, there is no installation of A-SMGCS (Advanced Surface Movement Guidance and Control System). According to ICAO Doc. 9830 [12], which discusses Advanced Surface Movement Guidance and Control Systems, A-SMGCS is a system that provides routing, guidance, and surveillance for the control of aircraft and vehicles to maintain the specified surface movement rate under all weather conditions with the "aerodrome visibility operational level" (AVOL) while ensuring the necessary safety level. According to Skybrary (2021) [13], A-SMGCS is a modular system consisting of various functions to support the safe, orderly, and expeditious movement of aircraft and vehicles at airports under various conditions related to traffic density and airport layout complexity, considering capacity in various visibility conditions and visual relationship between controllers and aircraft/vehicles. There are four basic functions of A-SMGCS as mentioned in the ICAO Manual: Surveillance, Control, Planning/Routing, and Guidance. To address areas with limited visibility for controllers, Perum LPPNPI Medan branch has installed CCTV cameras. Many CCTV cameras are installed around the aerodrome and inside the AirNav building. However, there are no CCTV cameras directed towards the apron. This becomes a problem for the controllers due to the lack of visual information obtained.

To address this issue and create air traffic services prioritizing flight safety and security without adding ATC workload, the author proposes several solutions that can be implemented by Perum LPPNPI Medan branch:

1. Short-term solutions:
 - a. Relocating the control desk position.
 - b. Installing CCTV cameras directed towards Apron Whiskey.
2. Long-term solutions:
 - a. Installing A-SMGCS (Advanced Surface Movement Guidance and Control System).
 - b. Adding a section to the Standard Operating Procedures (SOP) that requires controllers to ensure visibility of aircraft and vehicle movements in the ground area, prioritizing direct visual observation and standing if necessary.



Picture of The initial layout of the control desk. [6]



Picture of The proposal for the new layout of the control desk. [6]

V. CONCLUSION

In this study, there are several conclusions that can be drawn by the author, including:

1. The need for relocating the control desk to ensure safety in managing air traffic.
2. The importance of visibility of movement traffic in the ground area to be clearly observed.
3. The necessity of installing CCTV cameras directed towards the apron.
4. Installing A-SMGCS to address the issue of obstructed views caused by pillars inside the tower.

VI. ACKNOWLEDGEMENT

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