

THE INFLUENCE OF WORKLOAD DURING COVID-19 PANDEMIC ON THE PERFORMANCE OF AIR TRAFFIC CONTROLLER AT AIRNAV DENPASAR BRANCH

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Abstrak

Penelitian dilakukan di AirNav Cabang Denpasar dengan tujuan untuk mendapatkan gambaran apakah ada pengaruh beban kerja Air Traffic Controller (ATC) yang muncul selama masa pandemi Covid-19. Proses pengolahan data dilakukan di Politeknik Penerbangan Indonesia Curug (PPI Curug) mulai Desember 2020 hingga Agustus 2021. Metode yang digunakan adalah kuantitatif. Populasi dan sampel ini adalah seluruh ATC Tower Perum LPPNPI Cabang Denpasar yang mengoperasikan penggabungan sektor Ngurah Ground, Ngurah Tower, dan Clearance Delivery. Teknik pengumpulan data yang digunakan adalah studi dokumentasi yang berisi data tentang Performance Check ATC Tower, dan kuesioner Nasa-TLX. Ditemukan bahwa terdapat hubungan negatif dan berbanding terbalik (berlawanan arah) antara Beban Kerja Pemandu Lalu Lintas Udara dengan Kinerja sebesar -0,439. Pengaruh pemenuhan beban kerja pemandu lalu lintas udara terhadap kinerja ATC penerbangan sebesar 19% dan sisanya ditentukan oleh faktor lain yang tidak termasuk dalam bagian penelitian. Perlu adanya perhatian khusus pada setiap beban kerja ATC Tower, dan perlu adanya sosialisasi kepada tower controller untuk meningkatkan dan mempertahankan kinerja, mengadakan training atau refreshing course bagi personel ATC.

Kata Kunci : penyedia pelayanan navigasi udara, pemandu lalu lintas udara, kinerja ATC, beban kerja ATC, covid-19

Abstract

The research was carried out at AirNav Denpasar Branch with the aim of obtaining an overview of whether there was an effect of the Air Traffic Controller (ATC) workload that arose during the Covid-19 pandemic. The data processing process is carried out at the Curug Indonesian Aviation Polytechnic (PPI Curug) from December 2020 to August 2021. The method used is quantitative. This population and sample are all ATC Towers of Perum LPPNPI Denpasar Branch which operates the merger of the Ngurah Ground, Ngurah Tower, and Clearance Delivery sectors. The data collection technique used is a documentation study that contains data on the Performance Check of the ATC Tower, and the Nasa-TLX questionnaire. It was found that there is a negative and inverse relationship (opposite direction) between Air Traffic Controller Workload and Performance of -0.439. The effect of fulfilling the workload of air traffic controllers on flight ATC performance is 19% and the rest is determined by other factors that are not included in the research section. There needs to be special attention to each ATC Tower workload, and it is necessary to disseminate information to tower controller to improve and maintain performance, conduct training or refreshing courses for ATC personnel.

Keywords : air navigation service provider; air traffic controller; ATC performance; ATC workload; covid-19

PRELIMINARY

Indonesia is known internationally for its coastal tourism. Kuta beach is one of them which is used as a tourist attraction on the island of Bali. With the development of the times, the island of Bali is increasingly in demand by foreign tourists for vacations to enjoy the beaches around the island. The development of the world of aviation in Indonesia is currently also growing quite rapidly. This is marked by traffic flow visits which must be done by providing good traffic services as well (Hibatullah et al., 2022).

In providing optimal flight traffic services, of course, it must be supported by many things, one of which is Human Resources (HR), which in this case is the Air Traffic Control (ATC) or known as Air Traffic Controller (ATC) in global terminology (CASR 19 Sistem Manajemen Keselamatan, 2017). ATC as human resources has an important role in an air navigation service (Safety Management Manual Doc 9859, 2018; Aircraft Accident Incident and Investigation, 2020).

Air navigation services in Indonesia are provided by the Perum Lembaga Penyelenggara Pelayanan Navigasi Penerbangan (LPPNPI) or commonly known as Airnav, which is under the coordination of the Ministry of SOEs with Garuda Indonesia and Angkasa Pura. Airnav has many branches in Indonesia, one of which is the Denpasar Branch Office, which provides air traffic control services in the Bali archipelago. Airnav Denpasar Branch has 2 (two) air traffic control service units, namely the Approach Control Unit (APP), and the Aerodrome Control Tower (TWR) (LPPNPI, 2018).

In the Aerodrome Control Tower (TWR) service unit, the work position is divided into 3 controller sectors, namely: Ngurah Tower Controller, Ngurah Ground Controller, and Ngurah Clearance Delivery Controller (LPPNPI, 2018). Prior to the COVID-19 pandemic, these three sectors carried out their respective duties according to their functions. Until the end of the Covid-19 pandemic, causing a decrease in the number of aircraft movements globally, including in Bali.

For the sake of work efficiency and reducing the risk of controllers being exposed to the covid-19 virus, management has taken a policy to combine the 3 (three) controller sectors into only 1 (one) controller sector, namely the Ngurah Tower Controller sector. So that the Tower controller's workload increases, namely concurrently as a tower controller, ground controller and clearance delivery controller (LPPNPI, 2018).

With the number of aircraft traffic decreasing during the COVID-19 pandemic, ATC must have high preparedness to concentrate on providing valid information to pilots about aircraft conditions, weather, and conditions at the airport, both departures and arrivals so that separation can be optimized. and maintain safety in operation (ICAO, 2016, 2018).

The workload has a considerable influence on the level of ATC preparedness, moreover there are several similar call signs appearing simultaneously, such as: WON1831 & WON1821, JST038 & JST083 (Widyanti et al., 2010). In addition, at I Gusti Ngurah Rai airport there is an apron taxiway configuration which often hinders the path of planes that have just landed and want to taxi out so that as an ATC Tower Denpasar must always look at the condition of the aircraft in the final if you want to provide pushback clearance. Of course this adds to the ATC load (Lestary, 2020; Lestary et al., 2021).

ATC personnel need a good psychological condition to create high concentration and alertness in dealing with heavy traffic conditions (ICAO, 1984, 1993). This psychological condition is an important factor in air traffic services, because if it is not fulfilled it will cause unwanted things (Amalia, 2019; Annex 19 Safety Management, 2016; Safety Management Manual Doc 9859, 2018).

METHOD

The research uses quantitative research methods with a population of 33 people and has characteristics, namely, Airnav Indonesia employees who work and operate sector mergers at the Aerodrome control unit at Airnav Denpasar Branch and have worked for a minimum of one year. While the sampling technique used is using a saturated sample.

- **Method of collecting data**

The data collection method in this study used a questionnaire and was made based on the emergence of measurement needs in order to reveal more deeply about the subjective workload level that explains the stages in measuring workload using the NASA-TLX method (Hart, 2016). The NASA-TLX methods include (1) an explanation of the workload indicators to be measured, (2) the measurement of the NASA-TLX method such as weighting, rating, calculating product value, calculating weighted workload (WWL), and calculating average WWL (Hart, 2006). Using the NASA-TLX method This is to produce data in the form of measuring the level of workload experienced by workers (Hart, 1988).

Tabel 1. Skor Golongan Beban Kerja
(Diniaty, 2016)

Golongan Beban Kerja	Nilai
Sangat Rendah	0 – 20
rendah	21 – 40
Sedang	41 – 60
Tinggi	61 – 80
Sangat Tinggi	81 – 100

- **Data analysis method**

The data processing process carried out in this study used the SPSS Version 25 application. While the method used by the author was a quantitative method. Furthermore, the stages of data processing carried out by the author in this study include (1) Testing the basic assumptions which consists of a normality test, and a linearity test. (2) Relationship analysis consisting of correlation coefficient, coefficient of determination, simple linear regression, and hypothesis testing (Siregar, 2017; Sugiyono, 2018).

RESULTS AND DISCUSSION

1. Overview

In accordance with Aviation Law No. 1 of 2009 article 271 which states that in providing air navigation services, the government establishes an air navigation service provider, which also refers to ICAO recommendations (Undang-Undang Penerbangan, 2009). After that, Government Regulation No. 77 of 2012 was issued regarding Public Companies (Perum) the Indonesian Air Navigation Service Provider (LPPNPI) or Airnav Indonesia (Pemerintah Indonesia, 2012). On January 16 2013, Airnav officially operated and became the single provider of flight navigation services in Indonesia.

Aerodrome Control Tower serves to provide clearance delivery, ground control service, and aerodrome control service. The aerodrome control tower service units at Airnav Denpasar Branch include the following (LPPNPI, 2018).

a. Ngurah Rai Aerodrome Control

The airspace control tower, with the call sign Ngurah Tower, is responsible for operations on the runway and aircraft flying in the vicinity of the aerodrome, Ngurah Tower operates at a frequency of 118.1 MHz.

b. Ngurah Rai Ground Control

The ground controller, known as Ngurah Ground, is responsible for the movement of aircraft in the maneuvering area (except the runway), Ngurah ground operates at a frequency of 118.8 MHz.

c. Ngurah Delivery Control

Responsible for ensuring that all departing aircraft have a flight plan (FPL) in accordance with the valid time slot, provide relevant information regarding aerodrome conditions, weather and other flight information related to the flight plan, and provide ATC clearance in accordance with the FPL the. Ngurah Delivery operates at a frequency of 121.85 MHz.

Aerodrome Control Service at I Gusti Ngurah Rai International Airport is carried out by Ngurah Delivery, Ngurah Ground, and Ngurah TWR, which are the responsibility of Airnav Indonesia Denpasar branch. The function of the airspace scouting service around the airport carried out by the Denpasar branch of the TWR Airnav Indonesia unit is to provide information and permits to aircraft under its responsibility to ensure safety, regularity, and smooth flight traffic around I Gusti Ngurah Rai International Airport by purpose of preventing collisions.

Operation Hours Ngurah Delivery provides flight traffic services every day at 23.00 – 12.00 UTC; Ngurah Delivery is responsible for ensuring that all departing aircraft have FPL in accordance with the valid time slot, provide relevant information regarding aerodrome conditions, weather and other flight information related to their flight plans, and provide ATC clearance in accordance with the FPL. Ngurah Delivery operates at a frequency of 121.85 MHz (LPPNPI, 2018).

2. Research Results

Variable X Research data obtained in the form of answers to the Workload questionnaire (variable X) distributed to ATC personnel at the Aerodrome Control Unit (TWR) Airnav Denpasar Branch which found 33 people. The results of data processing using the NASA-TLX questionnaire, it was found that the average workload of the ATC Tower Airnav Denpasar Branch was 53. This condition could mean that the workload of the ATC Tower at Airnav Denpasar Branch was in the medium category (53) based on the group score table workload.

Meanwhile, based on the results of the ATC performance check, it was found that the average ATC Performance check score was 96. This means that the ATC performance is in a good category in accordance with the Decree of the General Civil Aviation Number KP 166 of 2020 concerning the establishment of technical and operating standards. section 69-01 which states that if the results of the performance check are above 70, it is in the good category.

The effect of workload during the covid-19 pandemic on the performance of the ATC Tower Airnav Denpasar Branch. The data processing in this study used the program SPSS version 25 as a helper program.

As explained in the data processing in the previous three chapters, the stages of the data processing sequence are as follows.

a. Normality test

Based on the results of calculations using SPSS, obtained the value of Sig. on the ATC Workload (X) is .712 which means 0.712 and Sig. on Performance ATC (Y) is .081 which means 0.081. In accordance with the basis for decision making in the Kolmogorov-Smirnov normality test, it is concluded that the data is normally distributed.

b. Linearity Test

Based on the results of the calculation with SPSS, the value of Sig. on Deviation from Linearity of .141 which means 0.141. In accordance with the basis for decision making in the linearity test above is $0.141 > 0.05$, it can be concluded that the workload on performance has a linear relationship or X data with Y data has a linear pattern.

c. Correlation coefficient

The value of the Correlation Coefficient on ATC Performance (Y) is -.439 which means -0.439. In accordance with the provisions of the correlation level and the strength of the relationship between the variable ATC workload during the Covid-19 pandemic and ATC performance is -0.439 so it can be concluded that the X variable and Y variable have a sufficient relationship.

The correlation coefficient number is negative, namely -0.439, so that the relationship between the two variables is inverse or the type of relationship is opposite in direction, thus it can be interpreted that the higher the ATC Workload, the ATC Performance will decrease.

d. Coefficient of determination

The coefficient of determination is obtained at 20%, this comes from squaring the value of the correlation coefficient or "r", namely $(-0.439 \times -0.439) \times 100\% = 19\%$ so it can be concluded that the ATC Workload variable (X) affects the ATC Performance variable (Y) by

19%. While the rest (100% - 19% = 81%) is influenced by other variables or variables that are not studied

e. Simple Linear Regression

Based on the SPSS output table, the value of a in the simple linear regression formula can be seen from the Constant value in the Unstandardized Coefficients is 103,644. This value is a Constant value which means that if there is no fulfillment of ATC Workload (X), the consistent value of ATC performance is 103,644. The value of b in the simple linear regression formula can be seen from the value of fulfilling the ATC Workload (X) on the Unstandardized Coefficients is -0.143. The regression coefficient value is negative (-), it can be said that ATC Workload (X) has a negative effect on ATC Performance. So that the regression equation $Y = 103.644 - 0.143 X$ is obtained. Thus, to determine the ATC Performance of the existing ATC Workload, it can be predicted through the regression equation. This means that for every 1-point addition to the ATC Workload (X) level, the ATC Performance will decrease by 0.143 at a constant 103,644.

f. Hypothesis t Test (Partial)

The value of t-count = $-2.718 > 2.040$ (t-table), and the value of sig 0.010 0.05, it can be concluded that H_0 is rejected, and H_a is accepted, and the t-count value of -2.718 lies in the area of negative influence which means that "There is a Negative ATC Workload During the Covid-19 Pandemic on ATC Tower Performance.

3. Solution

Airnav Denpasar Branch's policy to combine 3 sectors in the Aerodrome Control Unit into 1 sector is appropriate because the workload of the ATC tower personnel is in a moderate position so that the policy can be continued. However, to keep the implementation going well, Airnav Denpasar Branch needs to supervise and evaluate the implementation of the policy to anticipate if there is a significant change in traffic movement. In addition, there needs to be awareness of ATC personnel to always maintain health and implement the health protocols that have been set by the government until the Covid-19 pandemic ends, because without healthy employees, Airnav Denpasar Branch will not be able to run properly.

During the COVID-19 pandemic, the performance of the ATC Aerodrome control tower personnel at Airnav Denpasar Branch was still very good. Thus, ATC personnel are expected to be able to maintain their performance. On the other hand, the strength of the influence of ATC Workload with Reverse or Counterclockwise ATC Performance. This means that if the ATC Workload increases, the ATC Performance will decrease.

There needs to be special attention from the management to pay attention to the workload of ATC implementers in accordance with traffic developments in the field if you want to make policies. So that the performance of the ATC remains good. In addition, it is necessary to conduct training for personnel, because to start a new policy, training is needed first so that ATC can understand and adapt to the new policy.

CLOSING

Conclusion

The ATC workload at the Aerodrome Control Unit Airnav Denpasar Branch after receiving the third merger, namely Ngurah Ground, Ngurah Tower, and Clearance delivery unit is classified as Medium. This is based on the results of the NASA-TLX questionnaire which shows an average Work Weighted Load (WWL) of 53 (medium), the results of ATC performance research obtained through a performance check test, indicate that the average ATC performance is 96 and quite good, and It is proven that there is an effect of ATC Workload during the Covid-19 Pandemic on ATC Performance at Airnav Denpasar Branch. The effect is shown by the regression equation $Y = 103.644 - 0.143 X$. The strength of the influence of ATC Workload with ATC Performance is Reversed or in the Opposite Direction. If ATC Workload increases, then ATC Performance will decrease. The strength of the relationship between ATC Workload and ATC Performance at the level of the relationship shown by the correlation coefficient of -0.439 Contribution of ATC Workload to ATC Performance which is 19% by 81% is caused by other factors not examined by researchers.

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