

The Influence of Personnel Workload at the Control Area Unit to Service Quality of Air Traffic Center (ATC) in Jakarta

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Abstract. This study aims to investigate the influence of personnel workload at the ATC (Air Traffic Center) to service quality of ATC using quantitative approach. The data was collected using a questionnaire, to grasp the respondents' perception. The population of this study are those who work in ATC, Jakarta, Indonesia. Purposive sampling technique is employed in this study. The number of the respondents of this study are 20 persons comprising, air traffic control staff and managers. The data was analyzed using SPSS. . The result shows that there is a significant influence on personnel workload at the control area unit to service quality of air traffic center in Jakarta, Indonesia.

Keywords : service quality, jakarta air traffic service centre (ATC), personnel workload.

Abstrak. Penelitian ini bertujuan untuk mengetahui pengaruh beban kerja personel di ATC (Air Traffic Center) terhadap kualitas pelayanan ATC dengan menggunakan pendekatan kuantitatif. Data dikumpulkan menggunakan kuesioner, untuk memahami persepsi responden. Populasi penelitian ini adalah mereka yang bekerja di ATC, Jakarta, Indonesia. Teknik purposive sampling digunakan dalam penelitian ini. Jumlah responden penelitian ini adalah 20 orang yang terdiri dari, staf kontrol lalu lintas udara dan manajer. Data dianalisis menggunakan SPSS. Hasil penelitian menunjukkan bahwa terdapat pengaruh yang signifikan terhadap beban kerja personel di unit area kontrol terhadap kualitas pelayanan pusat lalu lintas udara di Jakarta, Indonesia

Kata Kunci : kualitas pelayanan, jakarta air traffic service centre (ATC), beban kerja personel

1. Introduction

The development of the aviation industry continues to experience a significant increase over time. This development is in line with the increasing growth of air transportation due to the public's interest in the need for transportation that has various aspects, such as comfort, safety, and effectiveness. With the increasing interest of the Indonesian people in the use of air transportation services, the movement of aircraft in the air has increased. Using an airplane is no longer a luxury that can only be enjoyed by the upper class. The lower middle class, students, and college students are now accustomed to traveling by plane. Airports are also getting more crowded, because the number of passengers is increasing. Indonesian people have the same opportunity to enjoy air transportation services at affordable rates and still pay attention to the aspects of aviation safety and security.

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The development and growth of the aviation industry cannot be separated from the increase of the number of air transportation services users. Based on statistical data from the National Statistics Agency, the following is a table of production of domestic aviation companies from 2016 to 2020.

Table 1.1

Airline Companies	Domestic Airline Production				
	2016	2017	2018	2019	2020
Passengers	89.385.365	96.890.664	101.961.268	79.466.559	35.393.966
Goods (TON)	604.343	587.017	651.184	577.806	430.752

The table above explains that from 2016 to 2018 the number of domestic passengers continued to increase. However, from 2019 to early 2020, the world of aviation experienced a very significant decline due to the COVID-19 pandemic. The COVID-19 pandemic has affected all aspects of various businesses, especially tourism. However, since the beginning of January 2022 until now, the economic situation in Indonesia has started to improve in line with the increasing number of users of transportation services, especially air transportation. Along with economic growth which some time ago experienced a decline due to the COVID-19 pandemic, now Indonesia is starting to experience economic growth which turns out to be directly proportional to the growth of transportation users, especially air transportation. With the increase in the number of aircraft movements, both domestic and foreign flights, the flight safety factor is indeed very influential in carrying out a flight operation, especially by proportional human resources in carrying out operational tasks to carry out flight operations. Not only air crews are influential in carrying out flight operations, but also the existence of a flight traffic control operation unit with reliable equipment and standardized systems are important for flight operations to be carried out properly.

The aviation safety factor is indeed greatly influenced by proportional human resources in carrying out operational tasks for regulating / guiding flight traffic, reliable equipment and standard systems. One example is the management of aviation traffic guides called Air Traffic Controllers.

The task of an aviation traffic guide or Air Traffic Controller is a job that is quite risky for flight safety both on the land side and air side; therefore, it is necessary to support human resources both in terms of quantity and quality so that the implementation of flight traffic scouting activities can achieve its target, namely to support flight safety.

There are 3 (three) aspects that affect the performance of ATC officers, namely: air traffic density, ATC equipment available at the airport, and no less important, human resources.

The number of ATC that is not in accordance with the needs in ideal conditions, especially in Indonesia will affect the performance of these officers in carrying out air traffic services, because it brings an impact on working hours, physical-psychological conditions, and work pressure which will eventually cause the ATCs to feel stressful and will also have impacts on flight safety.

The labor shortages have long been an unresolved problem. According to available data, the total number personnel of air traffic controllers (ATC) needed in Indonesia in 2010 was 317 at the airport's Technical Operational Unit (UPT). There were around 815 ATC personnel, including 236 in all airports under the auspices of the Directorate General of Civil Aviation, PT. 262 in all airports under Angkasa Pura I (Persero) and PT. Angkasapura II (Space Magazine 2011).

The task of air traffic scouting services carried out by the Air Traffic Controller (ATC) plays a very large role in the safety aspect, by looking at the conditions on the ground as well as matters relating to ATC. The numbers of human resources, equipment and working hours and working conditions are of great concern. These serious issues need to be addressed immediately so that aircraft accidents caused by human error, especially those caused by ATC can be minimized for the sake of aviation safety in Indonesia. Therefore, the authors are interested in investigating the influence of area control center unit personnel's workload to the quality of air traffic services in Jakarta Air Traffic Service Center.

Based on the background discussed above, the purpose of this study is as follows, "to investigate whether there is an influence between the area control center unit personnel's workload to the quality of air traffic services in Jakarta". Additionally, this study is expected to provide some contributions, particularly to the directorate general of air transportation as regulator to consider performance personnel in each sector. It is also expected to be a reference for those who want to conduct a research regarding to quality services and workload of personnel in ATC. This study and previous studies have some differences. The first is the object of research, previous research was carried out in the unit approach control unit where the unit handles services arrangements for arriving and departing aircraft. In addition, several studies related to this research

According to Subkhan (2017), there are several factors that are thought to have a close relationship with the workload of ATC, including the complexity and problems that arise in airspace. The workloads that arise include: the setting up of the aviation sector, the number of air traffic problems, the number of flight altitude transfers, the average airspeed, the sector area, the average separation between aircraft, the diversity of aircraft, variations in flying directions, the estimation of potential conflicts at regional boundaries and the weather. According to Meshkati in Tarwaka (2015: 104), workload is defined as the difference between the capacity or ability of the worker and the demands of the work to be performed. On the other hand, according to Tarwaka's Hart and Staveland (2015: 106), workload results from the interaction between task requirements, the work environment used as a workplace, skills, behavior, and perceptions of workers.

Additionally, Irvianti and Verina (2015) mentioned that workload is the amount of work that must be done in a position or organizational unit and is the product of the number of jobs and timw which are divided into 2 rating scales, including:

1. External Factors which include the tasks assigned, the complexity of the work, the length of work and rest time.
2. Internal factors which include motivation, perception, desire, and satisfaction.

From the above definitions, it can be concluded that the workload, both physical and mental, is an increasing perception of workers towards various activities in the workplace within a certain period of time.

According to human performance in air traffic management safety eurocontrol/faa action plan 15 safety, mental workload experienced by a controller will depend on many factors, such as the number of aircraft at a certain frequency, air traffic density, and fatigue factors such as the time of the service, insufficient rest hours, excessive working hours, and others. When the workload is too high (Overload) or low (underload) problems can occur, such as ignoring the chaos, forgetting the traffic density on certain routes while on duty, or seeing the wrong maneuver. Based on the journal, it can be concluded that the factors that affect the workload consist of several things, namely how much traffic is at a certain frequency, the level of traffic density and fatigue factors such as during work, rest hours, during daily activities and others. If the workload is too much or too little, the conflict that will arise is often ignoring the problem, not knowing when someone is flying past or giving the wrong direction. Hart and Staveland in Tarwaka (2015:106) explain that there are three factors that trigger workloads, including the fulfillment of tasks, efforts and capacity, which will be detailed as follows:

1. Job demands. The reason related to this factor is that the workload can be assessed from the analysis of the tasks performed by employees. However, everyone has differences that must always be considered.
2. Effort or method. The amount needed for a job may be a form of workload that is unconsciously formed naturally in each individual. However, due to the increased job description of the task, the individual may not be able to increase his or her performance level.
3. Performance. Several workload studies discuss those related to the level of performance that must be achieved. Performance evaluation alone does not provide a complete workload graph.

Besides the three factors that determined the workload above, there are several categories of workloads, namely as follows:

Table 1.2

BATASAN	KATEGORI	WAKTU KERJA
>70% (Lebih dari 70%)	OVERLOAD	>42 menit (Lebih dari 42 menit)
(53% - 69%)	Heavy Load	32 - 41 menit
(29% - 53%)	Medium Load	18 - 31 menit
(18% - 29%)	Light Load	11 - 17 menit
(0% - 17%)	Very Load	0 - 10 menit

Source: KP 265 Year 2017

The categories of workload above can be measured, according Doc ICAO 9426-AN/924, Air Traffic Services Planning Manual, Part II Section I Chapter I Appendix C, the workload assessment carried out by DORATASK (Director of Operation Research and Analysis) on the radar controller.

Observable tasks, namely tasks that can be recorded and measured in time by foreign observers, for example: a) Radiotelephony (RTF) and Telephone Communication, b) strip marking and direct-voice-liaison coordination, and c) Routine tasks.

Non-observable tasks, that is, tasks that are performed almost continuously by a busy controller concurrently with observable tasks that generally cannot be logged and timed directly by observers. These tasks include monitoring the radar layer (radar display) and planning such as what will be done (planning future action) by the controller, but this is an important thing in the sector controller.

Recuperation, that is the proportion of time that is not allocated to the specified task (observable task and non-observable task) but is considered important for the operational safety of the sector.

Sugirto (2002) defines service as an action taken to meet the needs of others, whose convenience can only be enjoyed by those who serve and those who are served. Service delivery is a movement made to meet the needs of others (customers, passengers, etc.), but only those who provide and are served can be satisfied.

"Service management is a management process whose activities are directed specifically at the implementation of services in order to meet the public interest or individual interests, through appropriate and satisfying methods for the parties served" (Moenir 2001: 25). It can be concluded that service management is a process of how to unite appropriate and effective ways in providing services so as to satisfy customers. According to the Decree of the Minister of State for the Utilization of State Apparatus No. 63 of 2003 concerning General Guidelines for the Implementation of Public Services, namely all forms of public service activities carried out by Government Agencies, both at the center and in the regions in the form of goods for general needs and special legislation. It can be concluded that public service is the provision of service contributions to the community. Excellent service to citizens which is an obligation for the state apparatus. As a public service provider listed in the Menpan Decree No. 63/KEP/M.PAN/7/2003 is the state apparatus. State apparatus is a forum consisting of a group of people who are specially selected to carry out government functions as a form of service to the community

The high secretariat of the state apparatus and its staff from both the Central and Regional levels including State-Owned Enterprises, State-Owned Legal Entities and Regional-Owned Enterprises

1. Public service providers listed in KepMenPan NO.63/KEP/M.PAN/7/2003 are functionaries of government agencies that carry out the duties and functions of public services listed in the laws and regulations
2. Users of public services are citizens themselves whose providers are carried out by government agencies.

The point above is a group of providers, namely providers who create various forms of services needed by citizens, for example education, health providers, public transportation, delivery parties and others.

Community Satisfaction Index is the level of community satisfaction in obtaining services obtained from service providers or service providers according to the expectations and needs of the community. So, it can be concluded that public services as mandated in the MenPan Decree NO.63/KEP/M.PAN/7/2003 must be carried out as well as possible by government agencies, in this case Perum LPPNPI which functions as air navigation operator in Indonesia, which is under the auspices of a State-Owned Enterprise as a supporter of the implementation of air transportation in order to achieve the level of expectations, needs and satisfaction of the public/community using air transportation services.

Service quality is the level of quality expected and managed to meet customer desires (Tjiptono, 2006). While the measurement of service quality are as follows:

1. Reliability. According to Zahruli (2006), it is the ability to provide appropriate services accurately and reliably, sympathetic attitude and with high accuracy to consumers. Reliability is measured by accurate service actions by employees, professionalism in handling consumer complaints, serving well and friendly, providing services appropriately and correctly in accordance with established procedures in providing services always according to a predetermined schedule Reliability means the company's ability to provide accurate and error-free service from the first time and provide its services according to a certain time.
2. Responsiveness (responsiveness). Kotler and Keller (2009) state that responsiveness refers to the willingness and ability of the service provider to assist customers and respond quickly to their requests. Zeithmal, et al (1990) stated that responsiveness is the response or dexterity of employees to assist customers and provide fast, responsive service, which includes: employee alertness in serving customers, the speed of employees processing transactions, and resolving customer or patient grievances.
3. Assurance, which includes the knowledge, capability, courtesy and trustworthiness of the staff, free from danger, risk or doubt. Kotler and Keller (2009) state that assurance relates to the knowledge and courtesy of employees and their ability to foster trust and customer confidence.
4. Empathy, including ease in building relationships, good communication, personal interest, and understanding of consumer needs. Kotler and Keller (2009) state that empathy means that companies understand their customers' problems, act on their behalf, take care of them personally, and have a pleasant working time.
5. Tangible evidence, including physical, equipment, employees and means of communication (Tjiptono, 2006). Kotler and Keller (2009) state that tangibles relate to the physical appearance of service facilities, equipment/equipment, human resources, and company communication materials. Tangible evidence is the company's ability to demonstrate its existence to outsiders' parties. The appearance and ability of the company's physical facilities and infrastructure compared to the conditions in the surrounding area is tangible evidence of a service provider's service.

Perum LPPNPI is an agency that provides Indonesian flight navigation service in the form of a State-Owned Enterprise (BUMN) whose capital is owned by the state and is not divided into shares in accordance with Law Number 19 of 2003. The purpose of establishing Perum LPPNPI is to offer navigation services. Flights by applicable flight efficiency and effectiveness standards, both domestically and internationally. Law Number 1 of 2009 concerning Aviation emphasizes the need to establish a director of aviation navigation services and special regulations for navigation services. Or the state of the flight navigation service provider agency (single ATS provider) Perum LPPNPI provides flight navigation services in all Indonesian airspace.

2. Research Methodology

The aims of this research are to investigate whether there is a significant influence on personnel's workload to the service quality of ATC in Jakarta. The research method used is a quantitative method. Sugiyono (2019) states that the quantitative method has been used for a long time and is called the traditional method because it has become a tradition as research method. Research data in this method are in the form of numbers and analysis using statistics.

Data was collected by distributing questionnaires using Google Form to employees of the Jakarta Air Traffic Center Unit Area Control Center. The population of this study is all the workers at ATC, in Jakarta. Population is a generalized domain composed of objects/subjects with specific properties and characteristics that authors study and draw conclusions from (Sugiyono: 2019).

According to Sugiyono (2019), sample is a fraction of the number and characteristics that a population has. The research sample used is when the population is large and it is not possible to study in all existing populations, so the authors use a research sample. In determining the sample size, the author uses purposive sampling. Purposive sampling focuses on a non-probabilistic sampling technique that selects objects to exhibit the desired properties in the sample. In other words, units are "deliberately" selected in the preferred sample. Also called evaluative sampling, this sample testing method relies on the judgment of the examiner in identifying and selecting the person, case, or event that can provide the best information to achieve the research objectives. The sample in this study was 20 individuals using targeted sampling techniques. The data analysis techniques used in this study used linear regression analysis, relation coefficient, and coefficient of determination. The data processing uses SPSS Statistics 24 software.

Quality of Service. Service quality is the level of excellence that customers expect and controlling the level of excellence to meet customer needs. The service quality questionnaire consists of 16 items. The indicators of service quality are based on Perez, et al., (2007) that service quality consists of five dimensions, there are assurance, reliability, tangible, responsiveness, and empathy. Each statement item uses a Likert scale of one to five. The number one represents strongly disagree and number five represents strongly agree

Air Traffic Controller. An air traffic controller is a person responsible for providing air traffic services, especially for aircraft, to prevent aircraft from getting too close to each other and to prevent aircraft from colliding with aircraft with obstacles around them during operation.

Area Control Center (ACC). Area Control Center is a unit that provides Air Traffic Control services on controlled flights to and from one or more aerodromes.

In conducting this research divides the variables into two, namely:

1. Independent variable (X). According to Sugiyono (2018) this variable is often called the stimulus variable, predictor variable, precondition, or independent variable. An independent variable is a variable that affects or causes the change or occurrence of the dependent (combining) variable. In this study, the author determines that the variable X or the independent variable is the ATC workload at the Jakarta Air Traffic Service Center Control Center Unit.

2. Dependent Variable (Y). According to Sugiyono (2018) the dependent variable (Y) is also known as the output variable, criteria, and consequences. Or often called as the dependent variable, the variable that is the affected variable or outcome. In this study, the dependent variable determined was the quality of air traffic services by aimav Jakarta Air Traffic Services Center personnel

Figure 1



3. Results and Discussion

Based on the observations we made at Perum LPPNPI, we obtained primary data in the form of answers of the opinions from employees regarding the workload in the control center unit area at Perum LPPNPI Jakarta, with 20 employees consisting of various work positions and also divisions/work units.

Regeresi multiple linear

Table 1.3

Coefficients ^a					
		Unstandardized Coefficients		Standardized Coefficients	
Model		B	Std. Error	Beta	t
1	(Constant)	10.793	3.225		3.347
	ATC WORKLOAD	.752	.110	.849	6.807

a. Dependent Variable: KUALITAS PELAYANAN

$$Y = 10,793 + 0.752 x$$

Y = service quality, X = ATC workload

In the explanation in the linear regression table is that for every increase in the unit value of the variable x (ATC workload) of 0.752, it will follow Y (Quality of service) increases by 10,793

Test F

Table 1.4

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	258.527	1	258.527	46.339	.000 ^b
	Residual	100.423	18	5.579		
	Total	358.950	19			

a. Dependent Variable: KUALITAS PELAYANAN

b. Predictors: (Constant), ATC WORKLOAD

From the output it can be seen that the calculated F value = 46,339 with a significance level of $0.000 < 0.05$, the regression model can be used to estimate the contribution variable or in other words, there is an effect of the ATC workload variable (X) on the service quality variable (y).

Coefficient of Determination(R²)

Table 1.5

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.849 ^a	.720	.705	2.362

a. Predictors: (Constant), ATC WORKLOAD

The table explains about the value of the correlation or relationship (R) is 0.849. From the output, the coefficient of determination (R square) is 0.720, which implies that the effect of the independent variable (x) on the dependent variable (Y) is 72%

Test T

Partial hypothesis testing (t test) is intended to determine whether there is a partial influence of the independent variable on the dependent variable. The results of the hypothesis in this test are as follows:

$$dk=n-k$$

$$dk=82-2$$

$$dk=80$$

$$dk=1.990$$

Table 1.6

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	10.793	3.225		3.347	.004
	ATC WORKLOAD	.752	.110	.849	6.807	.000

a. Dependent Variable: KUALITAS PELAYANAN

The T value for service quality is 6.807 while the T-Table value is 1.990. It can be seen that the t count is $6.807 > t \text{ table } 1.990$ and the significance value is $0.000 < 0.05$. So the hypothesis states that there is a positive and significant effect.

4. Conclusion

In conclusion, Airnav Indonesia or The Indonesian Aviation Navigation Service Provider (Perum LPPNPI) is a State-Owned Enterprise (BUMN) which operates as an international standard Indonesian flight navigation operator. Perum LPPNPI is tasked with providing flight navigation services at 285 location points throughout the archipelago, Airnav Indonesia also provides flight navigation services in a number of airspaces of other countries bordering Indonesian airspace. Based on the results of the study, it can be concluded that the simultaneous hypothesis testing shows that the ATC workload (X) has a significant effect on service quality (Y). Daftar Pustaka

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