



QUEUING MODEL DESIGN TO OPTIMIZE FOR PRE FLIGHT SERVICES DURING THE COVID-19 PANDEMIC. (Case Study At Sultan Hasanuddin International Airport Makassar)

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ABSTRACT

This study aims to determine the optimal timing for flight service users before making a flight (pre flight) at Sultan Hasanuddin International Airport Makassar. The optimal standard time during the Pre Flight process during the Covid-19 pandemic at Makassar Sultan Hasanuddin International Airport, and. Efforts made by airport managers in minimizing pre flight processing time.

This study uses the Flow Process Chart method which is a schematic/diagram depiction that shows all the steps in a program and shows how the steps interact with each other. Based on the results of the analysis, it is concluded that: the optimal time for Pre Flight Services activities at Sultan Hasanuddin International Airport Makassar is not in accordance with the standards that refer to the Decree of the Director General of Civil Aviation where the standard time is still high; the optimal time required for the Pre Flight Services process is 20 minutes 40 seconds for normal time and the standard time is 23 minutes 37 seconds; As for the efforts made to minimize pre-flight processing time, including improving the quality of human resources on duty, increasing airport capacity, correcting infrastructure, regular maintenance of the equipment used and maximizing service at the check-in counter, especially during peak loads.

Keywords: *work standard, pre flight services, flow process chart, normal time, standard time.*

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1. INTRODUCTION

The situation of the Corona virus Disease 2019 (Covid-19) pandemic that afflicts all over the world has resulted in a decline in the number of Indonesian people using air transportation services since January 2020 so that several regions(Ahmad et al. 2022), both domestically and abroad, have implemented a lockdown which has greatly impacted the economic growth of the region. , including both Domestic and International flight services.(Dahlan et al. 2022)

Passengers who travel before checking in are required to validate the results of the Rapid/Swab test (PCR). In the process of validating the results of the Rapid Non-Reactive test or PCR/Negative Swab and checking the evidence of the vaccination, it takes quite a long time, starting from queuing up to completion, which varies depending on the number of queues and the number of KKP staff,(Destriana 2018) which has not been added to the time when queuing. at checkin at the counter. (Afiah 2020) Several flight service users at Sultan Hasanuddin International Airport Makassar complained to the manager, including: the queue time at the KKP to validate the results of health checks such as rapid antigen tests, (Anggoro and Hidayat 2020)PCR swabs and proof of vaccination, queues at checks at the airport. Counter(Mail et al. 2021).

This study aims to find out the importance of optimization as one of the variables of time management that is needed for business people and company leaders to be able to manage / plan time well which can increase effectiveness, efficiency and productivity (Efendi 2007).

2. METHODS

The location of this research was carried out at Sultan Hasanuddin International Airport Makassar with a time span from May to June 2020. The population in this study were passengers who had just arrived at the airport who were about to take a flight. The sampling technique was carried out using the stratified random sampling method. The sampling method according to Slovin in (Sugiyono, 2007) is determining the sample with an error margin of 5%; 0.05 as follows:

$$n = \frac{N}{1 + (N * e^2)}$$

Where n is the sample size, N is the population size and e is the level of sampling error that can still be tolerated. The total population of 51 people was taken from the number of passengers on the Boeing 737-800 aircraft which were observed in the Covid-19 pandemic because of the implementation of health protocols on the plane, namely social distancing so that passengers cannot sit next to each other, there must be a distance of 1 seat next to them which must be vacated. . Determination of taking the

number of samples using the slovin formula is as follows:

$$n = \frac{51}{1 + (51 \times 0,05^2)} = 45 \text{ people}$$

The method used in this research is the Flow Process Chart, which is a schematic/diagram depicting all the steps in a program and showing how the steps interact with each other. Everyone responsible for improving a process should know all the steps in the process. Flow Process Chart is a map that describes all activities, both productive and unproductive activities, where the activities involved in the work implementation process are described in detail from beginning to end(Small, Ayyash, and Hamouri 2017).

Variable operational definition is a clearly stated definition of each variable in the study, and is translated into indicators(L'Hermitte et al. 2016). Indicators are certain dimensions of a concept that can be measured.

Variable	Size	Indicator
Passenger Arrival	Passenger travel time from the airport parking lot to the KKP inspection counter	Minute
KKP Validation	Time for checking health documents as a condition of flight	Minute
Check In + SCP-1	Inspection time to check the passenger list according to the reservation list, issue boarding passes, check passenger goods both baggage and cabin, and check passengers through metal detectors	Minute
SCP-2	Checking time for carry-on baggage in the form of cabin baggage, checking passengers through metal detectors	minute

Table 1. Variable Operational Definition

3. FINDINGS AND DISCUSSION

3.1. Findings

Flow Process Chart

Calculation of air passenger service activities at Sultan Hasanuddin International Airport Makassar with an average cycle time approach is shown in the following table:

Table 2. Observation of Passenger Departure Activities Average

No	Average observati on time (WTTA)	Work Element			
		Arrival	Validation KKP	Ccheckin SCP1	SCP2
1	05:00 - 07:00	00:06:22	00:06:09	00:06:08	00:03:45
2	11:00 - 13:00	00:06:36	00:06:11	00:06:38	00:03:41
3	15:00 - 17:00	00:06:19	00:06:08	00:06:52	00:04:06
Average Time		00:06:26	00:06:09	00:06:33	00:03:51

Based on the table above, the average cycle for each element of work observed is:

- The average time for the Arrival work element is 6 minutes 26 seconds,
- The average time for the KKP Validation work element is 6 minutes 09 seconds,
- Average time for Checkin SCP-1 elemental time is 6 minutes 33 seconds,
- The average time for SCP-2's elemental work is 3 minutes 51 seconds.

Then the normal time is calculated for each observed work element using the formula:

$$\text{Normal Time} = (\text{average observation time}) \times (\text{performance factor})$$

- Normal time for Arrival work element
 $= 6,26 \text{ minute} \times 90\%$
 $= 386 \times 0,9$
 $= 347,4 \text{ second} = 5,79 \text{ minute}$
- Normal time for Arrival work element Validasi KKP
 $= 6,09 \text{ minute} \times 90\%$
 $= 369 \times 0,9$
 $= 332,1 \text{ second} = 5,53 \text{ minute}$
- Normal time for Arrival work element Checkin + SCP1
 $= 6,33 \text{ minute} \times 90\%$
 $= 393 \times 0,9$
 $= 353,7 \text{ second} = 5,89 \text{ minute}$
- Normal time for Arrival work element SCP2
 $= 3,51 \text{ menit} \times 90\%$
 $= 231 \times 0,9$
 $= 207,9 \text{ detik} = 3,46 \text{ menit}$

To get the total normal time, all the observed element times are added up:

$$\begin{aligned} \text{Total normal time} &= (5,79 + 5,53 + 5,89 + 3,46) \\ &= 20,67 \text{ minute} \end{aligned}$$

The calculation of activities in aircraft passenger services uses a standard time study of work as follows:

$$\text{Standard Time} = \frac{\text{Total Normal Time}}{1 - \text{Allowance Factor}}$$

$$\text{Standard Time} = \frac{20,67 \text{ minute}}{1 - 0,125} = 23,62 \text{ menit}$$

Table 3. Comparison of Company Standards with Research Results

Work Element	Company Standard Time (hh:mm:ss)	Research time (hh:mm:ss)			
		Average time	Normal time	Total normal time	Standard time
Arrival	00:03:00	00:06:26	00:05:47	00:20:40	00:23:37
Validation KKP	00:03:00	00:06:09	00:05:31		
Check In SCP-1	00:03:00	00:06:33	00:05:53		
SCP-2	00:03:00	00:03:51	00:03:26		

Based on the comparison table above, it can be seen that the total normal time required for all processes (arrival, kkp validation, scp1 checkin, scp2) services before departure (pre flight service) for aircraft passengers at Sultan Hasanuddin International Airport Makassar during the Covid-19 pandemic is Rp. 00:20:40 (20 minutes 40 seconds) and the default time is 00:23:37 (23 minutes 37 seconds).

Meanwhile, in the average time column and normal time, there is a difference when compared to the company's standard time. This is because the company's standard time that is used as a reference is the standard time that was set and used during conditions prior to the Covid-19 pandemic.

The efforts made to minimize pre-flight processing time include improving the quality of human resources on duty, increasing airport capacity, correcting infrastructure, regular maintenance of the equipment used and maximizing service at checkin counters, especially during peak loads.

3.2. Discussion

The queue service system observed at the check-in counter can be described in the following figure:

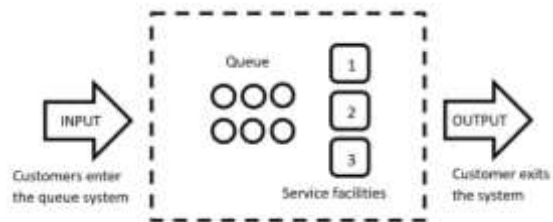


Figure 1 Queue Service System

Where passengers come to the queue system, queue, then get service, then exit the queue system. The form of service discipline that is applied is First come first served (FCFS), meaning that the prospective passenger who arrives first gets the service.

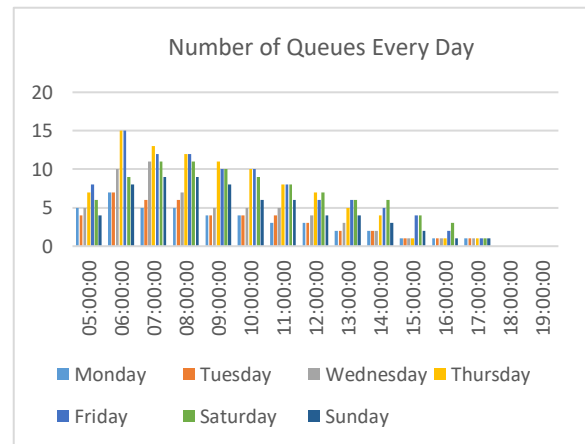


Figure 2. Graph of the Number of Queues at the check-in counter

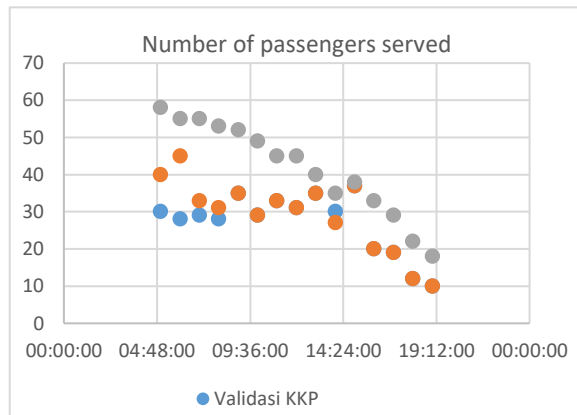


Figure 3 Graph of the number of passengers served

From the graph above, it can be seen that there is a fairly high queue at 06:00 to 11:00, while the highest number of passengers is served or during peak hours, which is between 05:00 and 12:00.

To determine the average hourly arrival rate (λ) by dividing the total passenger arrivals by the observation time:

$$\lambda = \frac{\text{total passenger arrivals}}{\text{total observation time}}$$

$$\lambda = \frac{498}{840} = 0,59 \text{ passengers per minute}$$

$$= 35 \text{ hourly passengers}$$

So the average passenger arrival rate at the check-in counter is 35 passengers hourly.

Determine the average level of passenger service (μ) using the formula:

$$\mu = \frac{\text{total service time}}{\text{total passengers}}$$

$$\mu = \frac{294}{498} = 0,59 \text{ minute}$$

Then the average service level is changed to the hourly service level.

$$\mu = \frac{1}{0,59} (60) = 101 \text{ hourly passengers}$$

So that the average level of service at the check-in counter is 101 passengers per hour.

The data is then entered into the POM-QM software for Windows, which results in:

Parameter	Value	Parameter	Value	Minutes	Seconds
MMMs		Average server utilization	.35		
Arrival rate (lambda)	35	Average number in the queue (Lq)	.18		
Service rate (mu)	101	Average number in the system (Ls)	.53		
Number of servers	1	Average time in the queue (Wq)	.01	.32	18.9
		Average time in the system (W)	.02	.91	54.55

Figure 3. QM For Windows service Check-In Solution

Generated by POM-QM software for Windows, it can be seen that the server utility factor or service facility is 0.35 which means the server busy period (p) is 35% and results in 65% idle time. The average number of passengers waiting in the queue (Lq) is 1 passenger. The average number of customers waiting in the system (Ls) is 1 passenger. The average time that passengers spend waiting in the queue (Wq) is 18.9 seconds. The average time that passengers spend waiting in the system is 54.55 seconds. Based on the results of the analysis, it can be concluded that the performance of the queuing system at the service stage at the check-in counter, the average waiting time for customers in the queue is 18.9 seconds with 1 passenger waiting in the queue.

4.CONCLUSION AND SUGGESTION

4.1 Conclusion

- The optimal time for Pre Flight Service activities, namely Aircraft Passenger Services (PJP2U) during the pandemic at Sultan Hasanuddin International Airport Makassar, is not in accordance with applicable standards where the standard time is still too high.
- The total normal time required is 00:20:40 (20 minutes 40 seconds) and the default time is 00:23:37 (23 minutes 37 seconds). This standard time of 23 minutes 37 seconds is referred to as the standard time for the pre-flight service process during the Covid-19 pandemic at Makassar Sultan Hasanuddin International Airport.
- Efforts made by the manager of Sultan Hasanuddin International Airport Makassar to minimize the pre-flight processing time during the pandemic include: improving the quality of human resources on duty in the airport area, adding terminal capacity and fixing supporting infrastructure, performing regular maintenance on the equipment used in the security process. checkin and also maximize service at the checkin counter, especially during peak loads, namely at busy hours and days.

4.2 Suggestion

- a. Airport managers can carry out Overall Clearance Time (OCT) measurement activities in the Pre Flight Services process so that they can find out the time spent by passengers in Aircraft Passenger Services (PJP2U) activities. Sultan Hasanuddin International Airport Makassar can rearrange the layout of the elements. researched so that time optimization can be better than before.
- b. To maximize pre-flight service so that it approaches the time of the SOP for domestic passenger service, airport managers can make repairs/replacements to inadequate service facilities, review parking and traffic in the airport area, maximize the number of check-in counters serving passengers and also need to hear input from parties. service users of Sultan Hasanuddin International Airport Makassar.

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