Analysis of efficiency between self-check in and conventional check in with queue method (case study at terminal 3 Soekarno-Hatta airport)

Tukhas Shilul Imaroh[1*), Abdul Hafaz Ngah[2], Sugiyono Sugiyono[1]
[1]Universitas Mercubuana, Indonesia
[2]University of Malaysia Terengganu, Malaysia

Article Info

ABSTRACT

Queues occur as a consequence of the limited-service facilities. Queuing systems can occur in various places and times, one of which is checking in aircraft at Soekarno-Hatta International Airport Cengkareng. Comparative analysis of the time efficiency of the queuing system needs to be done to help make decisions on the implementation of the check in system to improve service performance in order to achieve customer satisfaction. This study aims to analyze the comparison of queue time efficiency between self-check in and conventional check using the queuing method. The population in this study are prospective passengers who will check-in at Terminal 3 Soekarno - Hatta Airport, the sample used is passengers who come and queue at the ticket check-in counter of Soekarno - Hatta Airport Tangerang to take boarding passes from February 2022. Sampling method using purposive sampling. The data collection method used primary data and secondary data. The data analysis method uses the Queuing System Performance analysis with the Multiple Line Queuing Model (M/M/S). The results of the research are expected to help solve problems, assist decision making and determine policies related to long queues at check-in activities at airports.

Corresponding Author:

Tukhas Shilul Imaroh
Universitas Mercubuana
Email: tukhas.shilul@mercubuana.ac.id

Introduction

The development of science today is very important for the expansion of our technological capacity. In the digital era of technology that continues to develop as it is today, all forms of service can be carried out with adequate digital, to help make it more practical and faster. Where Indonesia as an archipelagic country and growth continues to grow rapidly, everything must be done quickly and precisely (Milatussani, 2020). This technological advancement has been utilized by several business fields, both large-scale businesses and MSMEs. The development of information technology is increasingly penetrating into various business fields and various industries. One industry that has changed so much after adopting information technology is the travel industry. So the technology also adjusts to meet these needs. The rapid development of technology causes competition among tourism business actors in the travel industry (Agoes & Dewi, 2018). Thus, in this day and age, it is expected that all progress, even technical ones, will occur rapidly.

This is because the human population and technological sophistication continue to increase over time. Businesses force people, commodities and components to wait for services in situations where there are few resources in the economic system. One phenomenon that often occurs in everyday life in the business world engaged in services is the phenomenon of waiting. This phenomenon usually occurs when the need for a service exceeds the capacity available for the delivery of that service (Badri & Irawati, 2016). In such cases, waiting is called a queue. The development of queues due to the quantity and quality of service is relatively low and limited in meeting customer service demand (Rinaldy et al., 2022).

According to (Waris et al., 2018), Queue is a consequence of the relative cost and limited service facilities. The queuing system starts from the arrival of customers to get service, waiting to be served if the service facility is still busy, getting service and then leaving the system after being served (Abdy et al., 2017). Queues occur due to an imbalance in the ratio of the number of customers to the number of service facilities. In service activities, waiting is considered to cause customers to be frustrated, angry, and anxious. Waiting too long in the service queue provided by the service provider results in an unfavorable assessment of the service provider. Queuing phenomena often occur at toll booths, cinema counters, bus queues at bus stops, patients waiting for treatment, and other public services.

The speed of service time in the queuing system affects the length of the queue (Budiman et al., 2020). Companies that are slow in the service process, resulting in long queues. On the other hand, if the company can provide effective services in a short time, the queue that is formed will not be too long. Where queuing has become commonplace, under certain conditions customers have to wait for a varied time, some are long enough, some are short, and some are too long so that it can cause unrest (Handoko & Astuti, 2017). Where queuing has become commonplace, under certain conditions customers have to wait for a varied time, some are long enough, some are short, and some are too long so that it can cause unrest. In addition, a queue is a waiting line from customers (units) who require services from one or more services (service facilities). In general, queuing systems can be classified into different systems where queuing theory and simulation are often widely applied (Siagian, in (Botutihe et al., 2018)). So that to provide customer satisfaction, a system always tries to provide the best service.

The best service among them is to provide fast service so that customers are not left waiting too long (Purba & Taufik, 2018). This service aims to reduce crowds or queues of passengers when doing offline check-in at the airport. Until now, there are still many passengers who do not understand the use of web check-in services (Agustus & Fatmayati, 2022). There are several behaviors of customers looking at the queue, namely first, choosing to be involved in the queue in order to get service. Second, customers in the queue opt out and then come back if the queue is too long. Third, customers who have been waiting for a long time come out of the queue before being served. These various behaviors are because each customer has different considerations. The customer's choice is not only detrimental to himself, but the company is also indirectly harmed, because it will create a bad image and even customers can easily leave the queue before being served.

Queues are also experienced in many land, air, and sea transportation services. The accuracy of services, the availability of facilities and infrastructure will determine the continuity of the transportation business. Along with the times, the aviation sector is getting more advanced and modern, air transportation mode activities are growing rapidly with the development of knowledge and technology (Hendiyana et al., 2022). According to (Darusman, 2020) apart from having more sophisticated technology, air transportation is the fastest means of transportation compared to other means of transportation. Air transportation is an option for business people in general. The airport as the place for the embarkation and debarkation of air transport must be able to provide the facilities and infrastructure needed for aircraft operations. This causes the need for an increase in facilities and infrastructure to support its rapid use. One of the 2019 IATA Global Passenger Survey Results shows that the top passenger priorities include: Using a smartphone was identified by more than half of passengers (51%) as their preferred check-in method. This is a 4% increase from 2018.

Technological advances in check-in activities have 5 types of check-in systems, namely conventional check-in, online or web check-in, mobile check-in, self baggage drop and self check-in (Ardiansyah & Ahyudanari, 2017). The conventional check-in system is check-in through a counter served by human resources. This system still has drawbacks such as long queues at the Check-in Counter. For online or web check-in and mobile check-in, there are systematic check-in similarities, but there are differences, namely online or web check-in using a browser and mobile check-in using applications found on the Google Play Store. The self check-in technology system is a facility/place that functions to complete various procedures and security requirements and services using a machine excluding baggage drop.

According to (Retnasary et al., 2019) , the self-check-in information system is one of the facilities in the form of a machine that has a function in completing services and procedures. This self check-in system has a

very easy procedure, by simply scanning the barcode or entering the e-ticket number, then selecting a seat and printing the boarding pass. The self check-in information system falls into the category of easy to use. Because users only need to enter the registration number or scan the barcode. The self-check-in system is a self-service facility that functions to complete various procedures and security and service requirements that use a machine and not including baggage drop (Pamungkas, 2021).

Indonesia's geological conditions that support this increase are not only related to the number of air transportation (passengers or goods) but also the frequency of air traffic that transports them. The aviation service industry has a very prospective business opportunity in the world of transportation which is marked by the existence of various airlines that have been established in Indonesia with the increasing number of air transportation user services from year to year (Jannah & Sukmana, 2022). For example, Soekarno-Hatta International Airport has 1200 flight schedules that change each other, which previously was only around 800 flights per day. Based on the facts presented above, Soekarno-Hatta International Airport is one of the airports with the highest number of passengers in Indonesia, around 32 million people per year pass through this airport (Rachman, 2019).

The airport service business is one of the businesses that has used a lot of technology in the service area for its service system. However, there are still airports that use manual methods to serve the check-in process for passengers. To get a boarding pass, passengers must queue at the airlines check-in counter, prepare files, and wait while the check-in process is carried out by the officer. In the manual system, it is known that this system still often encounters obstacles, among others, long queues, long check-in service processes, difficult file preparation, and difficulty finding a suitable check-in location for airlines. Conditions like this make passengers feel dissatisfied and uncomfortable. Passenger satisfaction and comfort is important for airports.

In a case like this, it occurs at Terminal 3 of Soekarno - Hatta International Airport, one of the airports that still uses the manual service method and the queuing system to get a boarding pass during the check-in process. For information on Terminal 3 International Airport. Soekarno Hatta is an airport terminal from Soekarno – Hatta International Airport serving Jabodetabek. Located on the east – north side of the airport. The terminal has a different design from other terminals. Terminal 3 is built with a contemporary modern design, eco-friendly and traditional taste.

Operational problems such as queuing and the conventional check-in process require a relatively long time to be carried out by passengers, this can be overcome with the help of a self-check-in machine using a self-service system design. This system confronts passengers with a system that will assist in carrying out the check-in process independently without having to wait or go to the check-in counter clerk, and passengers are given the convenience of checking in without having to show files because they only need to enter their last name and booking code. The application of the system through the self check-in machine will be more attractive.

Research conducted by (Ardiansyah & Ahyudanari, 2017) states that self check-in is very influential in reducing the queue length by at least 15 passengers in Scenario 1 and 6 passengers in Scenario 2 during the check-in process. Furthermore, research conducted by (Rachman, 2019) states that conventional check-in methods are more efficient than self-check-in looking at the number of users, also factors that cause conventional check-in models to be more desirable than self-check-in due to humanity factors (officers in the check-in area) and passenger knowledge factors that still do not understand existing developments including self-check-in. From the various problems above, further research will be carried out regarding the comparative analysis of the efficiency of self check in with conventional check in at Terminal 3 Soekarno - Hatta International Airpor. The purpose of this study is to find out which is more efficient queuing service with self check in or conventional check in at Terminal 3 Soekarno - Hatta Airport at Terminal 3 Soekarno - Hatta Airport

Method

The research method used in this study is a quantitative method which According to According to (Sugiyono, 2019), research with quantitative methods is a research method based on the philosophy of positivism, quantitative methods are used in research with a determined population or sample, data is collected using research instruments, quantitative or statistical data analysis is carried out, aiming at conducting conjecture testing that. It has already been determined. This research was conducted in the Check-in area of Terminal 3 Soekarno Hatta International Airport, quantitative descriptive. as the object is a prospective passenger who will do the check-in process at Terminal 3 Soekarno - Hatta Airport with purposive sampling technique. Data collection techniques are carried out by means of literature studies, and documentation. The analytical method used is the queuing system performance analysis method in accordance with operational characteristics.

Results and Discussions

The number of passenger arrivals at Terminal 3 Soekarno Hatta Airport

The following is the data on the number of passengers for 6 days at Terminal 3 of Soekarno Hatta Airport who queued for manual check-in or using the system.

Table 1. Number of Garuda Airlines Passengers Who Will Check In In The System at Terminal 3 Soekarno Hatta Airport

Time	D	I	D	I	D	I	D	I	D	I	D	I
	15 Feb		16 Feb		17 Feb		18 Feb		19 Feb		20 Feb	
	24 jam (h1)		24 jam (h2)		24 jam (h3)		24 jam (h4)		24 jam (h5)		24 jam (h6)	
00:00-00:59	45	160	43	110	33	70	48	195	27	60	29	125
01:00-01:59	391		485		478		396	41	546		354	
02:00-02:59	72		61		65		80		65		44	
03:00-03:59	91		147		58		56		143		47	
04:00-04:59	195		200		132		125		109		123	
05:00-05:59	321		534		252	50	213		659		146	
06:00-06:59	1032		840		669		667	40	984		561	25
07:00-07:59	907	30	440	149	760		992		303	60	730	10
08:00-08:59	612		549	14	379		377	30	556	33	289	
09:00-09:59	667	5	447	10	696	74	690	23	593		488	20
10:00-10:59	594		593		668		543	91	547		524	
11:00-11:59	721	40	756	60	541	35	502	30	825	70	694	55
12:00-12:59	585		362		822		757		543		677	
13:00-13:59	726		504		465		523		405		398	
14:00-14:59	298		213		634		442		447		382	
15:00-15:59	528		453		267	2	265	15	726	4	289	24
16:00-16:59	238		252		428		669		343	20	469	60
17:00-17:59	228	125	300	180	260		285		365	210	135	
18:00-18:59	283	90	193	20	175	80	253	130	149	115	99	50
19:00-19:59	70	20	65		281	70	149	45	78	20	59	10
20:00-20:59			23		60		56				27	
21:00-21:59		125		120		80		125		125		100
22:00-22:59		30		10		30		20		20		
23:00-23:59		115		208		213		129		128		40
Jumlah	8604	740	7460	881	812	704	8088	914	8413	865	6564	519
Total	9344		8341		8827		9002		9278		7083	

Note: D (Domestic) I (International

Data on the number of passengers in 7 days from 15 Feb 2022 to 22 Feb 2021. Total on 15 February 2022 passengers who come domestically and abroad amounted to 9,344 people with an average of 13 people per

hour. February 16, 2022 number of passengers who came was reduced to 8,341 people with an average of 11 people per hour. Then it rose on February 17, 2022 to 8,827 people with an average of 12 people per hour. On February 18, 2022, the number of passengers who arrived was 9,002 people with an average of 11 people per hour. The average total number of passengers arriving for one week from February 15, 2022 to February 21, 2022 is 8,571 people.

Prospective Garuda Indonesia flight passengers, who already have tickets, can carry out online check-in activities using cellular phones at the Garuda Indonesia Call Center. This service is available starting from 24 to 4 hours before the scheduled departure of Garuda Indonesia aircraft. Garuda Indonesia check-in online is done in three ways. The first way is by visiting the company's official website. The second way, by using. The third way, using the official Traveloka application and website. With this online check-in service, Garuda Indonesia aircraft service users do not need to check-in at the airport before passengers travel by plane.

The Garuda Indonesia Web Check In Terms and Conditions are explained with additional information that this online check service only applies to bookkeeping for a maximum of 9 people (Group booking). This online check service is not available for passengers who need special assistance at the airport for example; passengers who are pregnant, children under 12 years old traveling alone, Unaccompanied Minor (UM), require wheelchairs, stretcher cases or other special handling at the airport. This online check service is also not available for prospective baby passengers under 2 years who do not occupy a seat. This online check-in service is not available for passengers who do not purchase tickets in advance.

Queue System Analysis
Self-Check in Queue System
The standard of service for serving passengers is the regulation of the minister of transportation number PM 178 of 2015 which is 3 minutes per passenger with an interval of 60 minutes, so the average number of service levels (μ) is 20 passengers.

Table 2. Self Check In Queue Performance Results for 6 days

Variabel	Value					
	15-Feb-22	16-Feb-22	17-Feb-22	18-Feb-22	19-Feb-22	20-Feb-22
λ/Jam	13	11	12	11	12	9
μ	20	20	20	20	20	20
M	1	1	1	1	1	1
ρ	0,65	0,55	0,6	0,55	0,6	0,45
Po	0,35	0,45	0,4	0,45	0,4	0,55
Lq	1,21	1,22	0,9	1,22	0,9	0,37
Ls	1,86	1,67	1,5	1,67	1,5	0,82
Wq	5,57	3,67	4,5	3,67	4,5	2,45
Ws	8,57	6,67	7,5	6,67	7,5	5,45

Source: Data processed (2022)

Based on the table above, the average number of service levels (μ) is 20 passengers, with the service standard for serving passengers is 3 minutes per passenger with an interval of 60 minutes

Manual Queuing System
The manual queuing system at Terminal 3 Soekarno Hatta Airport is a multiple lane, so the queuing model used is M/M/S. When making observations, researchers must know the number of operating operators (M), the average passenger arrival rate (λ) and the average service level (μ). The next calculation is to find Lq, Ls, Wq, Ws, and Po. The standard of service for serving passengers is 4 minutes per passenger with an interval of 60 minutes, so the average number of service levels (μ) is 15 passengers. Based on the table above, the average number of service levels (μ) is 15 passengers, with the service standard for serving passengers is 4 minutes per passenger with an interval of 60 minutes.

From the results of the analysis using the multiple path model or M/M/S, which is more efficient between manual check-in and self-check-in using the system. From the results of the above calculations, the following results are obtained:

Table 3. Performance Results of Check In Queue Manual for Terminal 3 Soekarno – Hatta Airport for 6 Days

VALUE

VARIABLE	15-Feb-22	16-Feb-22	17-Feb-22	18-Feb-22	19-Feb-22	20-Feb-22
λ/Jam	13	11	12	11	12	9
μ	20	20	20	20	20	20
M	1	1	1	1	1	1
ρ	0.87	0.73	0.8	0.73	0.8	0.6
Po	0.13	0.27	0.2	0.27	0.2	0.4
Lq	5.63	2.02	3.2	2.02	3.2	0.9
Ls	6.5	2.75	4	2.75	4	1.5
Wq	26	11	16	11	16	6
Ws	30	15	20	15	20	10

Source: Data processed with POM-QM software

Table 4. Comparison of Efficiency of Manual Check-in and Self Check-in System:

Variable	*Self Checkin*	Manual *Checkin*	REMARK
λ/Jam	11.33	11.33	same
μ	20.00	20.00	same
M	1.00	1.00	same
ρ	0.57	0.76	SUPERIOR *SELF CHECK IN*
Po	0.43	0.25	SUPERIOR MANUAL *CHECK IN*
Lq	0.97	2.83	SUPERIOR *SELF CHECK IN*
Ls	1.50	3.58	SUPERIOR *SELF CHECK IN*
Wq	4.06	14.33	SUPERIOR *SELF CHECK IN*
Ws	7.06	18.33	SUPERIOR *SELF CHECK IN*

Based on the calculation results above, manual check-in requires more time with less capacity. To make time more efficient, the counter for manual check-in should be added so that it can load more passengers at the same time, especially on holiday days or long weekends. Counter officers must also be equipped with good SOP knowledge, so that the services provided are maximal and fast. It needs to be done. Because service in general is any activity aimed at providing satisfaction to passengers through this service process the wishes and needs of passengers can be fulfilled (Maylan & Istiyani, 2022). So the time required for manual check-in is faster than self-check-in. Based on the results of the above calculations for performance at Self check-in in order to stay awake and efficient, airport officers are required to post information related to good and correct Self-check-in procedures, or it could be by placing 1 or 2 officers near the Self-check-in machine so that if it occurs Complaints are quickly responded to and resolved.

Based on the data above, the use of the self-check-in method does not mean removing the long queue, but the queue is determined by the ability of prospective passengers to access the internet and their skills in filling out the fields contained in this self-check. However, the use of self-check technology has succeeded in shortening the queue length. Approximately one third of the queue length can be accelerated by using this self-check technology compared to checking this manuall. So this research is in line with research conducted by (Ardiansyah & Ahyudanari, 2017) which states that self check-in is very influential in reducing the length of the queue by at most 15 passengers in Scenario 1 and 6 passengers in Scenario 2 during the check-in process.

Conclusions

Based on the results of research conclusions and data analysis that has been carried out, several conclusions in this study are that manual check-in takes more time in terms of service. The waiting time for manual check-in is also still too long so it will cause queues. And Then the average service time for passengers in manual queues is too long because passengers only wait for an average service every day, which is 14 minutes, which is long enough for a passenger service. After That Untilitas (p) and Po Average in manual checkin, utility (p) is 0.76 or 76% of the time used by the counter to serve passengers. The average po or probability of not being in the queue is 0.25 or 25%, it is certain that there are almost very few counters that do not serve passengers. Then Untilitas (p) and Po Average in manual checkin, utility (p) is 0.57 or 57% of the time used by the counter to serve passengers. The average po or probability of not being in the queue is 0.43 or 43%.

References

Abdy, M., Sanusi, W., & Mukarram, T. (2017). Analisis Sistem Antrian Pada Unit Layanan Paspor (Ulp) Kantor Imigrasi Kelas I Kota Makassar.(Analysis Of Queue System On Passport Service Unit Class 1

Immigration Office Of Makassar). Sainsmat: Jurnal Ilmiah Ilmu Pengetahuan Alam, 6(2), 84–93.

Agoes, A., & Dewi, S. W. R. (2018). Motivasi Konsumen Dalam Menggunakan Layanan Tiketing Di Agen Perjalanan Konvensional. Journal Of Applied Science Tourism, 3(2), 159–171.

Agustus, A., & Fatmayati, F. (2022). Analisis Pengaruh Tingkat Pemahaman Dan Kendala Yang Di Hadapi Penumpang Terhadap Pemahaman Penggunaan Web Check-In Pada Maskapai Citilink: Studi Kasus: Bandara Internasional Adi Soemarmo Solo. Mamen: Jurnal Manajemen, 1(2), 178–187.

Ardiansyah, M. I., & Ahyudanari, E. (2017). Perbandingan Kinerja Pelayanan Self Check-In Dengan Check-In Konvensional Untuk Maskapai Citilink Dan Airasia Di Bandar Udara Internasional Juanda Surabaya. Jurnal Teknik Its, 6(2), E108–E113.

Badri, S., & Irawati, N. (2016). Model Antrian (M/M/2)(Fcfs/N/∞) Multi-Channel Single-Phase Untuk Optimalisasi Customer Service.

Botutihe, K., Sumarauw, J. S. B., & Karuntu, M. (2018). Analisis Sistem Antrian Teller Guna Optimalisasi Pelayanan Pada Pt. Bank Negara Indonesia (Bni) 46 Cabang Unit Kampus Manado. Jurnal Emba: Jurnal Riset Ekonomi, Manajemen, Bisnis Dan Akuntansi, 6(3).

Budiman, R., Hatidja, D., & Paendong, M. S. (2020). Analisis Sistem Antrian Di Pt. Bank Negara Indonesia (Persero) Tbk. Kantor Cabang Manado. D'cartesian: Jurnal Matematika Dan Aplikasi, 9(1), 8–15.

Darusman, N. A. (2020). Persepsi Pengguna Jasa Maskapai Penerbangan Terhadap Pelayanan Prima Cso (Customer Service Officer) Di Bandar Udara Sultan Syarif Kasim Ii Pekanbaru. Universitas Islam Negeri Sultan Syarif Kasim Riau.

Handoko, H., & Astuti, S. W. (2017). Queue Analysis At Yogyakarta Tugu Station. Jurnal Perkeretaapian Indonesia (Indonesian Railway Journal), 1(2), 105–115.

Hendiyana, A., Endah, D., Immamah, E., & Nurhayati, N. (2022). Proses Pelayanan Check In Di Malaysia Airlines Di Bandara Soekarno Hatta Jakarta Pada Masa Pandemi. Jurnal Transportasi, Logistik, Dan Aviasi, 2(1), 17–28.

Jannah, R., & Sukmana, H. (2022). Kualitas Pelayanan Jasa Penerbangan Pt Garuda Indonesia. Costing: Journal Of Economic, Business And Accounting, 6(1), 1077–1087.

Maylan, K. C., & Istiyani, Y. (2022). Pengaruh Pelayanan Check In Konvensional Dan Harga Tiket Terhadap Loyalitas Penumpang Maskapai Citilink Di Bandar Udara Internasional Ahmad Yani Semarang. Flight Attendant Kedirgantaraan: Jurnal Public Relation, Pelayanan, Pariwisata, 4(2), 324–329.

Milatussani, Y. (2020). Analisis Sistem Self Check-In Terhadap Kinerja Petugas Check-In Counter Pada Maskapai Citilink Di Bandar Udara Halim Perdanakusuma. Sekolah Tinggi Teknologi Kedirgantaraan Yogyakarta.

Pamungkas, A. (2021). Analisis Sistem Self Check-In Pada Kinerja Petugas Maskapai Citilink Di Bandar Udara Internasional Adi Soemarmo Solo. Sekolah Tinggi Teknologi Kedirgantaraan Yogyakarta.

Purba, A., & Taufik, I. (2018). Penerapan Sistem Antrian Registrasi Dengan Metode Multi Channel-Multi Phase. Jurnal Teknologi Dan Ilmu Komputer Prima (Jutikomp), 1(2), 221–228.

Rachman, I. A. (2019). 5 Perbandingan Kinerja Self Check-In Dan Check-In Konvensional Untuk Maskapai Garuda Indonesia. Jurnal Manajemen Dirgantara, 12(2), 78–84.

Retnasary, M., Setiawati, S. D., Fitriawati, D., & Anggara, R. (2019). Pengelolaan Media Sosial Sebagai Strategi Digital Marketing Pariwisata. Jurnal Kajian Pariwisata, 1(1), 76–83.

Rinaldy, A., Aryanti, J., Rachmandika, P., & Gunawan, F. E. (2022). Analisis Simulasi Antrian Penumpang Di Check-In Counter Bandara Menggunakan Discrete Event Simulation: Studi Kasus Citilink Di Bandara Soekarno-Hatta. Jurnal Pendidikan Dan Konseling (Jpdk), 4(5), 3449–3460.

Sugiyono. (2019). Metode Penelitian Kuantitatif, Kualitatif, Dan R&D. Bandung : Alphabeta.

Waris, M., Ridhayani, I., & Yusman, Y. (2018). Analisis Sistem Antrian Penumpang Di Loket Check-In Maskapai Penerbangan Pesawat Garuda Indonesia Airways. Bandar: Journal Of Civil Engineering, 1(1), 37–47.