

Qualitative Analysis on Airport Check In Capacity in Malaysia: Case of Northern Region (NR) International Airport

**Nor Aida Abdul Rahman¹, Mohammad Fakhruhnizam Mohammad²,
Afiah Azmi³, Md Fauzi Ahmad⁴**

^{1,2,3,4} Universiti Kuala Lumpur, Malaysian Institute of Aviation Technology
Corresponding author: noraida@unikl.edu.my

Abstract. The rise of air transport demand resulting to the increase need to enhance airport facility especially on check in counter capacity. This paper brings up the issue of existing customer experience of check in counter performance at one of the busiest international airport in Malaysia. This study aims to achieve two research objectives, to explore factors contribute to the need for expansion at check in area and to identify possible solution to overcome bottleneck at check in counter area. Qualitative methodology has been adopted in this study with utilizing semi structured interview, observation and document review as a main method for data collection. Thematical analysis has been performed in developing key themes to develop rich understanding on the issue discussed. Credibility, transferability, dependability and confirmability has been embraced in this study to ensure trustworthiness of the key findings. Findings suggest four key factor for check in expansion decision and propose three possible solutions to overwhelmed holdup at the check in counter. This study enhances current understanding on airport capacity and offer salient practical implication to the practitioner on both national and economic expansion decision. This study could also be a key reference for policy maker for future planning of international airport in Malaysia and neighbor country.

Keywords: airport check in, northern region, international airport

Introduction and Research Problem

Essentially, airport is recognized to play a strategic role to support transportation sector worldwide. The central purpose of the airport is to pursue success internally and externally by improving the quality of the airport services, as well as satisfying passengers (Pietro et al, 2017). In the literature, it is evident that design of the airport is the main factor in controlling the passengers' capacity in an airport. During day-to-day airport, operation required an efficiency accommodation capacity of passenger's demand. Capacity is a critical factor in airport development to accomplish reasonable development. Airport delays and congestion have become major threats to the aviation industry and capacity of the airport has become the main issue to deliberate. According to Xiao et al (2013), airport capacity should be enhancing parallel with the increase number of passengers or tourist. In fact, the airport could start capacity investment well in advance to avoid delay and congestion as this two issue are the major threats to the aviation industry.

Generally, airport capacity is among the most significant factor contributing to airport performance. Airport capacity is a complex issue consists from the operation of the airspace and runways through to the flow passengers through terminal. Airport capacity also refer to both physical and technological infrastructures (Jacquillat and Odoni, 2018). It also contributes to the issues that hinges on a whole range factors. For instance, the quantity of travelers you can get through a terminal is obliged not simply, by what number how many people you can physically fit in the building, but additionally via fitness and protection guidelines, how many bags the bags baggage system can process and how many of immigration and passport manipulate centers there are and so forth. With the increasing of air transport demand, the airport need to develop in term of runway and terminals. From the

operation of the airspace and runway through to the flow of passenger through the terminal, airport capacity is a complex issue that hinges on a whole range factors. Congestion in passenger movement will result in congestion at the check-in counter, insufficient queue area at check-in, congestion at immigration arrival and congestion at arrival hall due to insufficient depth. As emphasized by Ashford (2013) in his book title *Airport Operations*, the method of operation of the passenger terminal are using system to system approach which relate the associate problem with the terminal operation.

In Malaysia, there are eight (8) international airports in Penang, Langkawi, Malacca, Senai, Kuala Lumpur, Subang, Kota Kinabalu and Kuching. Although the current passenger movement at the northern region International Airport is not high, it can be associated with the current passenger demand is getting higher. At present, in the year 2018, the total passengers handled by northern region airport up to December was 558,967 more than the same period last year. It has increased to 7.8 million passengers compared with 7.23 million passengers. The growth of northern region airport for instance in Penang (PEN) has estimated at 8.2% compared with other airports. This high capacity of PEN through the increase of passenger movement will likely affect the role and efficiency of PEN. Examples, PEN will be the most congested airport caused by the higher of total passengers due to the lack of facilities to accommodate and control the situation. Basically, the airport additionally has 64 check-in desks and 11 gates, twelve aerobridges and three luggage claim belts. The problem is that PEN was build and designed to cater only 6.5 million of passenger per year. However, the capacity has exceeded this year up to 7.9 million in year 2018. This current number of passenger in PEN has fluctuates and lead to congestion at the airport. Therefore, this study aim to look this issue by exploring factors that can be implied at Penang International Airport (PEN). Penang was chosen in this study as at present, it is one of the busiest international airport in Malaysia, as well as expansion in PEN is necessary to cope with the increasing passenger load and number of airlines taking up space at the airport. With that, this study aims to answer the following research questions:

1. What are the possible factors that can be implied to the expansions of Penang International at check in process area?
2. What are the possible solution to optimize the check in process area at Penang International Airport?

In another words, this study aims to identify the factors that contribute to the expansions of the airport check in counter. In addition, this study also plans to explore possible solution to optimize the check in process area at Penang International Airport.

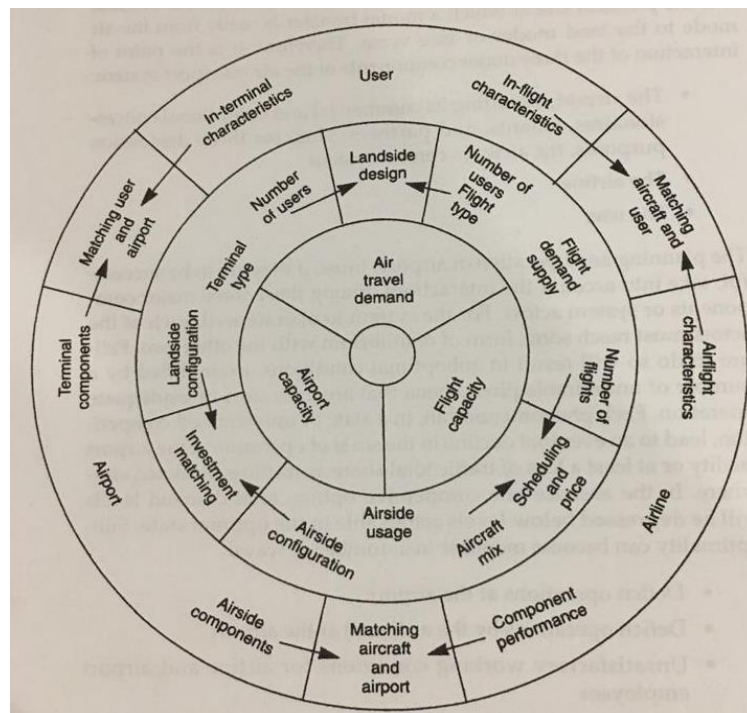
Literature Review

The notion of Airport and Airport Capacity

As explained by Gelhausen (2013), airport capacity is refer to with a wide range of definition relying upon the perspective embraced, for example in term of airport capacity at the terminal and other places in airport (Gelhausen, 2013). The airport terminal structures can be refer to a basic piece of the air transport framework since it is the physical site at which a model exchange is produced using the air mode to the land mode or the other way around. The airport design and the airport capacity is vital to avoid traffic at the airport, at the check in counter and delay in check in process. Delays will affects both passengers and airlines (Cook and Tanner, 2015). Adapting airport capacity to the expected level of traffic is a complex task. As suggested by Barnhart et al (2012), minor modification is important with involvement of management team where it is related to the strategic planning and tactical adjustments. In order to airport system to operate well, every players must reach some form of equilibrium with the other two. Failure to do so will result in suboptimal conditions, exemplified.

Dynamic capacity of airplane terminal can be estimated in the number of traveler per given time and characterized as capacity to serve the leaving travelers capacity in a given period (Nommik, 2017). Airport capacity becomes essential to the basic factor in air terminal improvement so as to accomplish supportable development. On the off chance that the interest vulnerability is high and limit and save cost are conversely low, an air terminal gets a genuine alternative for development. Other than that, an air terminal can utilize a development choice to improve its normal benefit. Below Figure 1 shows the hierarchical system of the airport relationship and airport capacity by a number of undesirable phenomena that are indicators of inadequate operation (Ashford, 2013).

Figure 1: Airport capacity and its relationship with operation indicators



Source: Ashford, 2013

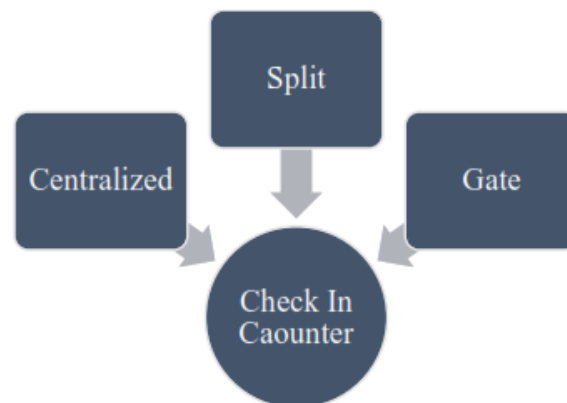
Check in Capacity

In general, check in was handled by airline employees who checked the air ticket, passenger and travel documents and then issued the boarding pass and baggage tag. Online check in started in early 2000 and it does expedite the passenger queues at the airport check-in desks. According to SITA (2012), at present almost 70% of passengers check in using a self-service channel. In fact the online kiosk or known as “Common Use Passenger Processing System” (CUPPS) for example is helping to reduce traffic at the airport during check in process.

According to Airport Development Report Manual, 2004, there are three typical check-in concepts that can be selected as shown in Figure 2 below.

1. Centralized Check-in.
2. Split Check-in.
3. Gate Check-in.

Figure 2: The three check-in concepts



Centralized Check-in

Travelers and baggage are prepared at registration counters situated in a typical, central area, for the most part, the takeoff dimension of the terminal. The counters might be divided into areas explicitly assigned for individual carriers or flights or, alternatively, travelers might be allowed to register at any counter position. In the event that the latter alternative is picked, specific consideration must be paid to the stuff arranging implications, which everywhere air terminals may require advanced and exorbitant systems. The registration counter arrangement picked will administer the width and depth of the terminal structure.

Split Check-in

The registration work is part between at least two areas inside the terminal complex. For instance, travelers and baggage might be acknowledged at focal registration counters, or alternatively at different areas around the airplane terminal including but not limited to:

- a. Check-in territory situated in the train station.
- b. Check-in territory situated in the car park.
- c. Check-in region situated in a business building situated on the airplane terminal.
- d. Access to the door relax.

Downtown registration: Attention must be paid to things acknowledgment at these remote areas. It is considerably more mind-boggling to take stuff from remote areas to the focal sortation corridor. The physical format of terminals with split registration system changes broadly in light of the assortment of kinds of strategies accessible. The aircraft favor a brought together registration design since split registration formats require extra carrier registration staff

Gate Check-in

Travelers continue with their things straightforwardly to the door and are handled at check-in counters preceding the suitable entryway relax. A decent example of this sort of registration format is Hanover, Germany. This idea:

- a. Simplifies registration dealing with strategies.
- b. Shortens traveler strolling separations inside the terminal.
- c. Reduces traveler revealing time.
- d. Reduces things arranging prerequisites.
- e. Could produce more staff prerequisites.

Qualitative Research Methodology

To answer the two research questions developed earlier in this study, the researcher opt for qualitative research methodology. As mentioned earlier, the focus of this study is on capacity check in counter at northern international airport, Penang Airport. To gather data, interview and observation has been performed in order to get rich information on possible factors to imply on PEN expansion, as well as possible solution to optimize the check in process area at PEN airport.

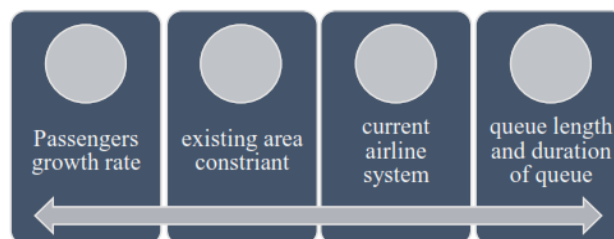
Five airport officer has been selected to be interview respondent in this research. An observation of the baggage check-in queuing time for each passenger during check-in process also was recorded to know the passenger movement during check-in process. In order to achieve the above objectives, the researcher used semi structured interview method.

All information from the interview has been transferred from the voice recorder to the word text. Thematical analysis or known as content analysis has been accomplished in order to identify the theme related to the possible factor and possible solution as mentioned earlier. Observation also completed to corroborate the findings from the interview. This is vital to ensure triangulation and the trustworthiness of the data. The researcher has fulfilled all four trustworthiness criteria namely, credibility, transferability, dependability and confirmability. The data comes naturally from the respondent and the researcher has not introduced any words to the respondent. Documents are also involved in this study by doing content analysis on two external sources namely annual report and master plan. The two main documents involved are Malaysia Airport Holdings Berhad annual report, and Penang International Airport Master Plan.

Findings and Discussion

From the findings, there are four critical factors that contribute to the expansion of the airport focusing on check in process area. As shown in Figure 3 below, the factors are growth rate of passengers, existing area constraint, current airline system available and also queue length and duration of queue per passenger. All interviewees agree, among all these four factors, the most significant factors contribute to the expansion of airport is queue length and duration of queue per passenger. For that, to corroborate this findings, the researcher has opt for observation to add more findings on this factors.

Figure 3: Key factors for airport expansion



Source: The authors

During the observation, the researcher has discovered the various segmentation such as type of flight, time of observation done, number of worker, number of counter open, and peak hour for the airport. Below table 1 discuss in detail on the observation protocol.

Table 1: Observation protocol

Observation checklist/ protocol	Detail
From the observation, the researcher have discover the following.	Researcher using peak hour as one of the criteria in collecting data to measure the average of check-in queuing time of the passenger. By collecting data in peak hours, researcher will collect the most efficient information for the check-in queuing time at the airport. Time before Estimated Time Departure (ETD) for the flight also considered by the researcher because data need to collect two hours for domestic flight and three hours for international flight depend on the Standard Operating Procedure (SOP) of the airlines. The researcher collects data two hours before the ETD of the flight.
Number of counter open	The counter open is focused on the baggage check in counter for passenger check-in their baggage before them boarding the flight. The duration of the counter open depend on the airlines SOP where standard counter open for domestic flight is two hours and for international flight is three hours. Number of counter open is monitored because it may affect the check-in queuing time for passenger check-in their baggage.
Number of worker at counter	The number of worker collected in this research to provide more reference and information for the collected data. The number of worker also may affect the check-in queuing time for passenger.
Number of baggage check-in	Number of baggage check-in by passenger according to the flight time and destination. Every baggage being check-in at the counter are counted by researcher. Number of baggage check-in also affect the baggage check-in time for passenger to check-in their baggage at the counter.
Time recorded per passenger check-in	Time recorded per passenger is time for the passenger check-in their baggage at counter. Time recorded using smartphone stopwatch when passenger arrive at counter until they leave the counter. Time recorded per passenger check-in their baggage is crucial to this research because researcher require this data to calculate the average baggage check-in queuing time for passenger check-in their baggage.
Total Processing time	Total processing time is the summation of the sample time taken during the observation done by the researcher.

Source: The authors

From the above interview and observation protocol, the researcher could conclude that there are three possible solutions to optimize the check in process in northern region airport, PEN. All five respondents agree that in order to optimize the check in process, additional kiosk and auto bag drop counter is a must. Secondly, common use check-in system and common use self-service is required. While the third one, to reduce traffic at check in counter is to spread the kiosk at various location and split the crowd.

Conclusion and future research recommendation.

To conclude, this research could be extend to another international airport for wider findings. This research may be beneficial to the airport authority and airlines to establish standards for evaluating airport performance in term of check in counter. Future studies on the following areas is recommended:

- a. Research on the future implementation of check-in counter system.
- b. Research on the effectiveness of self-check in rather than traditional check-in counter.
- c. Investigation on optimizing the airport check-in counter allocation problem.

Reference

1. Barnhart, D. Fearing, A. Odoni, V. Vaze (2012), Euro Journal Transport Logistics, vol. 1, 1-2, pp.135-155.
2. Cook, A., and Tanner, G. (2015). European Airline Delay Cost Reference Values, Updated and Extended Values, version 4.1, <https://www.eurocontrol.int/publications/european-airline-delay-cost-reference-values>
3. Jacquillat, A. and Odoni, A.R. (2018), A roadmap toward airport demand and capacity management, Transportation Research Part A: Policy and Practice, Vol. 114, part A, pp. 168-185.
4. 185.
5. Nommik, D. A. (2017). Modelling Regional Airport Terminal Capacity. Procedia Engineering, Volume 178, Pages 427-434.
6. Pietro, L.D, Mugion, R.G., Musella, F., Renzi, F, M. and Vicard, P (2017), Monitoring an airport check-in process by using Bayesian networks, vol.106, pp. 235-247.
7. SITA (2012) Passenger Self-Service Survey, available at <http://www.sita.aero/surveys-reports/industry-surveys-reports/passenger-self-service-survey-2012>