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Optimization of Distance Between Check-In Area and Boarding Gates: Case Study of Terminal 3 of Soekarno-Hatta Airport

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Abstract
This research assesses the effect of the distance between Terminal 3's check-in area and the boarding gate at Soekarno-Hatta Airport on passenger comfort. The focus is on how Terminal 3's layout, which places a significant distance between these points, impacts passenger experience, satisfaction, and their preferred solutions. The study uses qualitative methods, observing Terminal 3 facilities and reviewing relevant literature. The expected outcomes include a deeper understanding of Terminal 3's layout's influence on passenger satisfaction and the identification of management and design factors that could mitigate this issue. The research considers passenger perspectives and preferences to provide recommendations for enhancing passenger accessibility and comfort in Terminal 3.

Keywords: *airport design; airport terminal; distance; passenger comfort*

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1. INTRODUCTION

According to Law No. 1 on Aviation and Regulation PM.69 of 2013 concerning the National Aviation System, an airport is defined as "a designated area on land and/or water with specific boundaries used for aircraft landings and take-offs, passenger embarkation and disembarkation, cargo handling, and intermodal transportation connections, equipped with aviation safety and security facilities, as well as basic and support facilities" (Law No. 1 on Aviation, 2013; PM.69 of 2013). Airports play a vital role as hubs for air transportation networks, gateways for economic activities, intermodal transportation hubs, industrial catalysts, regional development drivers, disaster handling centers, and strengthen the national vision and sovereignty.

Passenger comfort at airports is crucial, as it can enhance passenger satisfaction, bolster the airport's image and reputation, boost passenger traffic, improve operational efficiency, and enhance safety and compliance. Airport managers can enhance facilities, services, and interior layouts to create a comfortable environment for passengers, thereby improving the travel experience.

Terminal 3 serves as the international flight terminal at Soekarno-Hatta Airport, with the primary goal of enhancing the performance of international flight operations. The construction of Terminal 3 aimed to address the issue of overload or excess capacity experienced in Terminal 2. Terminal 3 accommodates 54 airlines, including Garuda, Citilink, and other Sky Team member airlines, while others serve international routes. There are a total of 28 gates in Terminal 3, with gates 1 to 10 used for international flights and gates 11 to 28 for domestic flights.

One significant issue is the considerable distance between the check-in area and boarding gates at Terminal 3 of Soekarno-

Hatta Airport. The potential impacts of this problem include passengers having to walk long distances or use internal airport transportation to reach their designated boarding gates. This issue leads to longer passenger mobility times and an increased risk of flight delays. The distance between the check-in area and boarding gates can cause discomfort and fatigue for passengers, especially those with health issues. Accessibility for passengers with limited mobility must also be considered. Understanding this issue is crucial to finding appropriate solutions to enhance passenger experiences and operational efficiency at Terminal 3 of Soekarno-Hatta Airport.

This research aims to examine the impact of the spatial layout in Terminal 3 of Soekarno-Hatta Airport on the distance between the check-in area and the boarding gates. Additionally, the study seeks to evaluate how passenger comfort in Terminal 3 is influenced by this distance. Furthermore, the research will explore passengers' perceptions regarding potential solutions to address the issue of the distance between the check-in area and the boarding gates in Terminal 3.

The discussion of this research will encompass three main aspects. Firstly, an understanding of the impact of the spatial layout in Terminal 3 of Soekarno-Hatta Airport on passenger comfort. Secondly, the identification of factors contributing to the issue of the distance between the check-in area and the boarding gates in Terminal 3. Lastly, provide recommendations to airport management to enhance accessibility and passenger comfort in Terminal 3 of Soekarno-Hatta Airport. Thus, this research aims to comprehend, analyze, and offer solutions to issues related to the passenger experience in the terminal.

2. METHODS

The data collection method used in this research involves the use of both primary and secondary methods. The primary method used is the qualitative method, with an observational approach. Relevant data was collected through a qualitative approach using observational techniques at Terminal 3 of Soekarno-Hatta Airport. Observations were carried out in the check-in area, boarding gate, and the paths passengers had to traverse between these two locations. Data collected through observations included distances traveled, travel routes, available markers or signs, and passenger interactions with the surrounding environment. Additionally, observations were made regarding the condition of infrastructure and facilities, such as waiting areas, escalators, stairs, and corridors, as well as passenger mobility and interactions with airport personnel.

The secondary method used is the case study through the literature review method. The case study was conducted through a review of relevant literature, including articles, scholarly journals, research reports, previous case studies, and airport management policies. The purpose of the literature review was to gather and analyze various sources of information related to the spatial layout of Terminal 3 and issues related to the distance between the check-in area and the boarding gates. The goal of the literature review is to gain a comprehensive understanding of the issues at hand.

3. RESULT AND DISCUSSION

Terminal 3 of Soekarno-Hatta Airport has been meticulously designed to accommodate the land shape and size, as well as the necessary facilities to support operational activities within Terminal 3. The spatial layout has been crafted to provide comfort to both passengers and personnel engaged in travel-related activities within Terminal 3. Situated on the northeastern side of the airport, this terminal was previously known as Terminal 3 Ultimate before its integration with the older Terminal 3. It stands as the newest and largest terminal at the airport. With a total area of 422,804 square meters, it surpasses the size of Terminal 3 at Changi International Airport in Singapore by a slight margin.

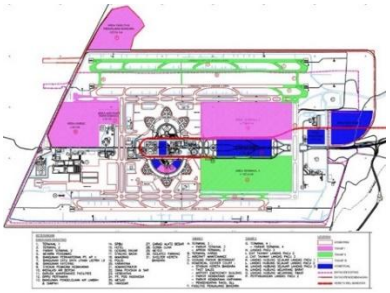

Figure 1. Soekarno-Hatta Airport Layout Plan
Source: Archive of PT Angkasa Pura II

The Terminal 3 building, located on the northeastern side of Soekarno-Hatta Airport, has a linear land shape, and as a result, the interior design follows the available land shape. Terminal 3 consists of four consecutive floors: the ground floor, the first floor, the mezzanine floor, and the second floor as seen in figure 1.

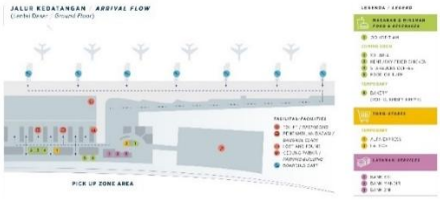

Figure 2. Soekarno-Hatta Airport Ground Floor Plan
Source: Archive of PT Angkasa Pura II

As seen in figure 2, the ground floor serves as the arrival area for passengers traveling on both international and domestic flights. On this floor, there is also a baggage claim area for passengers who have completed their journeys. Additionally, immigration and arrival visa checking services are located on the ground floor. Customs services for passengers arriving from abroad are also available here. The ground floor is equipped with several shops and restaurants for passengers looking to purchase food, beverages, or other necessities. Furthermore, restroom facilities and a prayer room are also provided on this floor. There are also 2 doors on this floor that passengers can use for transfers between Terminal 2 and Terminal 3 via apron buses.

Figure 3. Soekarno-Hatta Airport 1st Floor Plan
Source: Archive of PT Angkasa Pura II

The next floor is the first floor (figure 3). This floor, serving both domestic and international departures, hosts a total of 28 boarding gates. Security checks are conducted on this floor for passengers about to depart. Additionally, there are waiting areas around the boarding gates equipped with seating for passengers awaiting their flight schedules. Restroom facilities are also provided on the first floor for passenger convenience. This floor includes gates specifically designated for passengers using the shuttle bus service. This transportation service is reserved for passengers with boarding gate numbers 22 to 28. Passengers can access this service through Gate 13. In addition to the shuttle bus, this floor is also integrated with doors leading to the Skytrain, which passengers can use for transfers to Terminal 1 and Terminal 2.

Figure 4. Soekarno-Hatta Airport Mezzanine Floor Plan
Source: Archive of PT Angkasa Pura II

In Terminal 3, there is a mezzanine floor (figure 4) equipped with a dedicated lounge for business class and first-class passengers. Additionally, there is a special lounge for Garuda Indonesia passengers registered in GarudaMiles. In these lounges, complimentary foods and drinks are provided for passengers to enjoy their relaxation time in the lounge.

Figure 5. Soekarno-Hatta Airport 2nd Floor Plan
Source: Archive of PT Angkasa Pura II

The top floor in Terminal 3 is the second floor (figure 5). Passenger drop-off for departing flights is conducted on this floor. Before entering the check-in area and waiting lounges, passengers are required to pass through the security screening section for baggage scanning. The second floor serves as the check-in area for passengers, where identity and flight ticket checks are performed. The check-in process is also available for passengers wishing to check their luggage. Additionally, there are self-check-in machines for passengers who have booked tickets online. This floor provides plenty of available seating for passengers and accompanying individuals. Various restaurant and food kiosk options are also available for selection. The second floor is equipped with restroom facilities, a prayer room, and foreign currency exchange services.

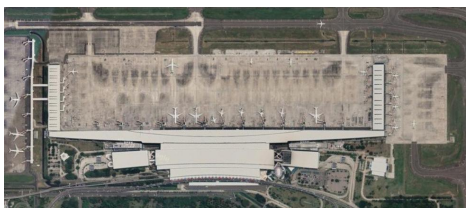

Figure 6. Satellite Image of Soekarno-Hatta Airport Terminal 3
Source: Google Earth

The spaces within Terminal 3 are organized in a linear layout as seen in figure 6, maximizing land utilization for operational activities for all airport users. This linear arrangement requires passengers, both departing and arriving, to traverse a 1 km-long corridor to reach their destinations, whether it's the boarding gate or the exit. The considerable distance passengers must cover increases the potential for discomfort, especially for those with limited mobility. Although the corridor area has travelators at some points, passengers still require approximately 15 to 30 minutes to reach their destinations on foot. When compared to other airports in Southeast Asia like Kuala Lumpur International Airport Terminal 2 (1.2 km) and Suvarnabhumi Airport in Bangkok (1 km), the length of Terminal 3's corridor at Soekarno-Hatta Airport meets standards. The reason passengers need to cover long distances on foot is that most narrow-body aircraft, such as short-haul domestic flights with frequent schedules, are parked at the far end of the gates.

Based on previous studies by Wilman (2017), it has been found that service quality influences passenger satisfaction at Terminal 3 by 47.9%, while the remaining 52.1% is affected by other factors. Another study evaluated passenger satisfaction with service quality at Terminal 3 and found that the overall satisfaction level was moderate. The study also identified that airport cleanliness, information availability, and staff behavior significantly impact passenger satisfaction. Additionally, facilities are an important factor, with passenger complaints about inadequate amenities such as insufficient seating, limited parking capacity, and a shortage of trolleys. Cleanliness is also a concern, especially the poor condition of airport toilets as perceived by passengers. Staff responsiveness is another issue, with complaints about unresponsiveness from some Terminal 3 staff. Furthermore, the availability of information and staff behavior also affect passenger satisfaction. To enhance passenger satisfaction at Terminal 3, improvements are needed in service quality, facilities, cleanliness, staff responsiveness, information availability, and staff behavior.

User complaints related to the distance between the check-in area and the boarding gates at Terminal 3 of Soekarno-Hatta Airport were collected through passenger posts on social media and mass media publications for case review. Based on user complaints on social media, many passengers have expressed dissatisfaction with the long distance they have to cover on foot. One Terminal 3 passenger at Soekarno-Hatta Airport voiced their concerns on Twitter. This passenger complained about the total distance of 1.2 km that needed to be

covered from the drop-off area to the boarding gate for the airline they were using.

Although there are shuttle bus facilities to accommodate the mobility needs of passengers who prefer not to walk far to the departure gate, these facilities are limited to domestic flights only, which means international passengers still have to walk. In addition to the shuttle bus, golf car/buggy car facilities were previously available at Terminal 3. However, according to the official website of Soekarno-Hatta Airport, there are only 36 vehicles, which is insufficient to fully accommodate passenger needs, resulting in passengers often complaining about waiting times for the golf car facility, which is frequently already full. Other passengers have complained about the interior design of Terminal 3, particularly the massive ceiling and continuous pattern design that creates a perception of vastness within the interior space and affects users' perception of the long corridor distance.

Compared to Terminal 3 of Soekarno Hatta Airport, Terminal 2 of Kuala Lumpur International Airport offers a smaller number of free buggy car facilities, with only 15 vehicles available, as stated on the official website of Kuala Lumpur International Airport 2. Despite the smaller number of buggy cars at Terminal 2, there are fewer complaints on social media regarding the distance passengers must travel to reach their designated gates. In light of the comparative analysis, it can be concluded that the quantity of buggy cars does not directly correlate with passenger comfort. This could be attributed to a multitude of factors, including but not limited to, terminal layout, signage clarity, availability of rest areas, and the overall passenger experience. Therefore, it is plausible to infer that a lower number of buggy cars does not necessarily compromise passenger comfort. This observation underscores the effectiveness of Terminal 2's management strategies and its passenger-centric design.

In contrast, according to the official website, Suvarnabhumi Airport offers a paid buggy car service that can be booked in advance, accommodating up to three passengers. This ensures a comfortable service upon landing, making the walking distance from the check-in area to the boarding gate less of a concern for passengers. This suggests that Suvarnabhumi Airport's approach to passenger mobility, which includes the provision of a paid, bookable buggy car service, offers a superior passenger experience compared to the other two airports.

The issues at Terminal 3 of Soekarno-Hatta Airport, such as the considerable distance between the check-in area and the boarding gates, mirror the broader issue of physical inactivity in Indonesia. Stanford University conducted a global study, published in Nature, to assess the activity levels of people in 111 countries, using smartphone data to track the average daily steps. The study, which is 1,000 times larger than previous ones, revealed that Indonesians walk the least, averaging 3,513 steps per day. This lack of physical activity is not solely due to laziness but also factors like inadequate public transportation and inaccessible pedestrian roads. Similarly, at Terminal 3, the lack of sufficient transportation facilities within the terminal and the vast interior design that enhances the perception of distance contribute to passengers' reluctance or inability to walk long distances. These issues highlight the need for improved design and management strategies at Terminal 3 and broader initiatives to promote physical activity in Indonesia.

Through a case review of passenger complaints on social media and mass media, there is consistency in the expression of passenger dissatisfaction regarding the long walking distance and inadequate facilities at Terminal 3 of Soekarno-Hatta Airport. Passengers have highlighted their difficulties in transitioning between the check-in area and the boarding gate, particularly for passengers with limited mobility. Some users have also expressed disappointment with the lack of adequate accessibility, including the absence of travelators/moving walkways along the walking route. Passengers have emphasized the need for improvements in the spatial layout of Terminal 3, suggesting efforts from the developers to shorten the distance between the check-in area and the boarding gate, enhance accessibility, and provide facilities that support passenger comfort. These complaints underscore the importance of effective

management in designing a more efficient layout and addressing passenger needs and preferences. This case review is expected to provide valuable insights into passenger perceptions and experiences related to the distance issue at Terminal 3 of Soekarno-Hatta Airport.

3.1. The Impact of Spatial Layout Design

Based on the collected data, several factors influence passenger comfort regarding the distance between the check-in area and the boarding gate. First, passengers' complaints revolve around the distance they have to cover on foot to reach the boarding gate. Complaints gathered from social media users and mass media publications indicate that passengers perceive the distance as too far. Passengers complain about a distance of approximately 1.2 km from the drop-off area to the boarding gate. While the shuttle bus only serves domestic passengers, international passengers have to walk. Other complaints are related to the limited number of shuttle bus vehicles, such as golf cars, which are often full, causing passengers to wait for the facility. Several solutions can be implemented to enhance passenger comfort. Transportation accessibility at Terminal 3 needs improvement, especially for international flight passengers. Shuttle buses or indoor transportation facilities should be increased in quantity and operational coverage. Additionally, more efficient facility placement should be considered to reduce the distance passengers have to cover. This could mean relocating the check-in area closer to the boarding gate or adding transit facilities between the two locations.

Figure 7. Corridor of Soekarno-Hatta Airport Terminal 3

The interior design of Terminal 3 also affects passengers' perception of the corridor's distance (figure 7). A continuous repeating pattern in the design gives the impression of a vast space and can enhance the perception of a longer distance. Due to the distance between the floor and the massive ceiling, passengers feel that the already significant corridor appears even longer, making the journey to the entrance more exhausting. The interior design of Terminal 3 needs to be reconsidered. Ceiling designs with patterns that reduce the perception of excessive space can help address the perception of a long distance, and more ergonomic and user-friendly designs can also enhance passenger comfort.

In summary, passenger comfort at Soekarno-Hatta Airport's Terminal 3 is significantly influenced by the spatial layout. Passengers feel uncomfortable due to several factors, including the long distances they have to walk, limited transportation facilities, and interior designs that make it appear even farther. Improving passenger comfort at Terminal 3 will have a positive impact on airport users and demonstrate the company's commitment to providing the best service. This discussion can assist airport management and relevant parties in enhancing the passenger experience by improving and upgrading the facilities, spatial layout, and interior design of Terminal 3.

3.2. Passenger Preferences and Implications for Airport Terminal Design

Based on the review of passenger preferences regarding solutions to address the distance issue between the check-in area and boarding gate at Terminal 3 of Soekarno-Hatta Airport, several options have been identified for implementation. In terms of improving transportation facilities, increasing the number of shuttle buses or golf cars to reach the intended gates is one of the desired solutions by passengers. By enhancing the capacity and frequency of these services, passengers can more easily and quickly transition between the check-in area and boarding gates. Additionally, the addition of comfortable and continuous moving walkways is considered important to minimize the distances that need to be covered. Another factor to consider is the strategic placement of boarding gates and check-in counters. Passengers expect more efficient positioning to reduce the distances they must

traverse. This can be achieved through a reconsideration of the layout of Terminal 3.

Improving the interior design is also crucial. Massive ceiling designs and continuous patterns can influence how far passengers perceive the distances to be. Therefore, improvements and refinements in design that create a more comfortable environment and make passengers feel closer to one another can help enhance passenger comfort. To make navigation within Terminal 3 easier and reduce confusion regarding distances, clearer and more easily followed signage is also required. Airport management can make informed decisions regarding facility improvements and spatial layouts in Terminal 3 based on passenger preferences. The airport can enhance the passenger experience and increase their satisfaction levels through these improvements.

4. CONCLUSION

Based on the findings of this research, it can be concluded that the spatial layout of Terminal 3 at Soekarno-Hatta Airport has a significant impact on passenger comfort. The research findings indicate that the distance between the check-in area and the boarding gate is a major issue affecting the passenger experience. User complaints on social media highlight the long distances that must be traversed on foot, the limitations of internal transportation facilities, and interior design elements that reinforce the perception of long distances. Additionally, a review of passenger preferences identified several desired solutions to address distance-related issues, such as providing efficient internal transportation, enhancing rest facilities, improving clear signage and information, and expanding and diversifying support facilities. Therefore, Terminal 3 management should take note of these findings and implement the suggested solutions to improve accessibility, comfort, and passenger satisfaction. Furthermore, the results of this research can serve as a crucial reference for the future development and improvement of the infrastructure and spatial layout of Terminal 3 at Soekarno-Hatta Airport, thereby significantly enhancing the passenger travel experience.

AUTHOR CONTRIBUTION

The first author (JFK) initiated the research idea, collected data, carried out the analysis, and determined the research results. The second author (HS) verified the data, strengthened the analytical synthesis, and verified the research results

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