

TRAFFIC DISTRIBUTION STUDY ON MULTI-AIRPORT SYSTEMS IN THE GREATER JAKARTA METROPOLITAN AREA (GJMA) AND ASSOCIATED IMPLICATIONS

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ABSTRACT

Multi-airport system development is becoming a common solution to capacity constraint problems in metropolitan areas around the world. GJMA, as the biggest air transport market in Indonesia, have a plan to change their airport system from a single airport system to a multi-airport system because of capacity constraints. To relieve the congestion problem in the existing airport, an expansion project and a new airport plan are being proposed by the government. The new airport will be located in a green-field site around a hilly area in the Karawang Regency and plans to start operating in 2019.

The government has not yet decided on the roles of the airport, but only proposed several scenarios to distribute the traffic for both airports. This study aims to understand the configuration of the traffic distribution of the new multi-airport system environment in GJMA, using a five step strategic planning methodology (CAIAD) which stands for Collect information, Analysing, Imaging, Assessing and Deciding.

The results of the study show that the traffic distribution can lead to implications on the existing and planned infrastructure, and for the airport users. The main implications are traffic volatility, underutilized airport infrastructure, traffic demand, that cannot be accommodated by the airports, operational difficulty and poor service for the airport users. To minimize these implications, the government should start planning the development of the new airport based on flexibility related to the actual traffic demand and improved the transport access facilities. This study also suggests two scenarios as options for the government to implement in the GJMA multi-airport environment.

Keywords: GJMA Airports, Capacity Constraint, Regulations Policy, Underutilize Airport and Airport Development.

1 INTRODUCTION

SHIA nowadays cannot perform very well as the main international gateway airport which serves the domestic and international markets traffic, because of the congestion due to the airport capacity constraints. Moreover, since the deregulation of air transport and the entry of low cost carrier services in the air transport market, the traffic volume has increased, mainly in terms of domestic scheduled flights, meaning that the situation is getting worse - especially for the airport users at SHIA.

With the above situation, it can be said that GJMA needs the new airport to accommodate its air traffic demand - and in 2011, the government began planning to build a new airport to relieve the congestion at the existing airport and accommodate the future demand. The government did not decide on the kind of roles between the airports operating in GJMA in the future, but only proposed several scenarios for the future roles between SHIA and the new airport. Therefore, this study will try to analyses the possibility of traffic

distribution between two airports in GJMA and the associated implications.

The purpose of this study are to:

- a) Analyze the possibility of traffic distributions based on the scenarios proposed by the government between the two Greater Jakarta Metropolitan Area airports during the development planning for the new airport (2019 – 2040).
- b) Assess the implications for the airport users and infrastructure facilities from the traffic scenarios proposed by the government.

The study area covers the municipalities and regencies in GJMA, and is composed of Jakarta, Bogor, Depok, Tangerang and Bekasi. Due to the time limitation, this study was mostly based on the GJMA multi- airport environment interim master-plan report from JICA (GJMA forecast data, old and new airport plans), along with desktop research.

The closest research that might relate to this subject in Indonesia is made by Pratomo (2012) which analyses

the train passenger demand between two different airports (Adi Sutjipto airport in Jogjakarta and Adi Sumarmo airport in Solo) from the competitor market point of view using stated preference technic and ordered profit modeled.

2 LITERATURE REVIEW

2.1 Multi-Airport System Definition and Location Worldwide

Multi-airport system is an airport system where there is more than one airport competing in the same metropolitan region to serve the air traffic, regardless of the ownership or the political influence of a single airport (Neufville and Odoni, 2003). In the airport industry, the multi-airport system is a sizeable segment. In 2003, there were about 30 metropolitan area worldwide, which included approximately 80 airports that implemented the multi-airport system (Neufville and Odoni, 2003) - and this number was increased in 2010 (Bonney et al., 2010).

2.2 Multi-Airport System Development

Neufville (2000) concluded that there are three main reasons for the development of the multi-airport system worldwide - namely, technical, economic and political reasons.

2.3 Distribution of Traffic in Multi-Airport System Environment

Neufville (2000) conducted a study that found the facts relating to the distribution of traffic in a multi-airport system.

- a) Multi-Airport System Natural Concentration of Traffic
- b) Traffic Specialization in Multi-Airport System
- c) Government Limitations in Allocating Traffic
- d) Volatility of Traffic at Secondary Airport

2.4 GJMA Airport System

From all airports that operate in GJMA, only SHIA and HPK airports serve commercial activities. However, only SHIA serves scheduled flight traffic in GJMA, because HPK Airport only serves general aviation activities. Therefore, this study only explains Soekarno-Hatta Airport and the future airport in Jakarta (New Jakarta International Airport or NJIA).

Since starting to operate in 1985, the passenger number of SHIA has grown steadily, and in 2011, SHIA reached its passenger record by serving over 47 million passengers (not including the transit passengers), exceeding the SHIA terminal capacity, which is only 22 million passengers annually (Aci.aero, 2012).

At the end of 2014, SHIA plans to accommodate 62 million passengers - and after that, there will be a final development for SHIA that will enable the airport to accommodate 87 million passengers annually (Aci.aero, 2012), 550.000 aircraft movements annually (JICA, 2011) and cargo capacity of 1,2 million tons annually (Ministry of Transport, Republic of Indonesia, 2008).

New Jakarta International Airport (NJIA) (called Karawang Airport by most Indonesian people) is a green-field airport project which is planned to support SHIA to accommodate the growth of air traffic demand in GJMA. Table 1 shows NJIA development plans.

Table 1. NJIA development plans (JICA, 2011)

	Phase 1 (2019-2029)	Phase 2 (2030- 2035)	Phase 3 (2036- 2040)
Terminal Capacity	30 Million Passengers	70 Million Passengers	90 Million Passengers

3 THEORITICAL BASE

3.1 Greater Jakarta Metropolitan Area

GJMA is a metropolitan area consisting of Daerah Khusus Ibukota /DKI Jakarta province (consisting of five different municipalities) and also several regencies/municipalities in surrounding areas, covering Bogor, Depok, Tangerang and Bekasi (Asri, 2005).

3.2 GJMA Forecasted Air Traffic Demand

The forecast of GJMA air traffic demand was conducted by JICA and PT. Angkasa Pura 2 as a part of the master plan study on multiple airport development in GJMA in 2011 using linear method based on 4.5% economic growth annually. The forecast was prepared for 30 years, from 2010-2040 for passenger traffic forecast and 2010-2040 for aircraft movement and cargo traffic forecast.

3.3 Factors Affecting Choice of Airports by Passengers and Airlines

Graham (2008) divided airport customers into three categories: passengers who use the airport facilities, airlines who buy the airport facilities directly, and concessionaires/tenants at the airport. In multi-airport environment, access time and cost, flight frequency and fares, passenger income and journey purpose are the main factors affecting choice of airport by passengers, while for the airlines, catchment area/demand, airport facility limitation, airport charges, capacity constraint/congestion and government regulation are the main factors.

4 RESEARCH METHODOLOGY

4.1 Location

The study area covers the municipalities and regencies in GJMA, and is composed of Jakarta, Bogor, Depok, Tangerang and Bekasi.

4.2 Research Data

The data that being used in this research is comes from the secondary data and the desktop research (internet research). The secondary data mostly comes from the Indonesia Ministry of Transportation, PT. Angkasa Pura 2 and the GJMA multi-airport environment interim master-plan report from JICA.

4.3 Research Process

A five step methodology (CAIAD) was adopted and developed to achieve the objectives of the study, CAIAD is a five step model for strategic planning, which stands for Collect information, Analyzing, Imaging, Assessing and Deciding. CAIDA is based on the well-tried strategic planning model principle (TAIDA) designed by Lindgren and Bandhold (2003). The research process diagram is shown in Figure 1.

5 ANALYSIS OF FACTORS AFFECTING CHOICE OF AIRPORT IN GJMA AND TRAFFIC DISTRIBUTIONS

5.1 Factors Affecting Choice of Airport in GJMA for Passengers and Airlines

From several factors, there is one factor that might have the largest influence on traffic distribution there, and this is the government regulation policy scenarios in terms of the airport roles. Therefore the Government Regulations are used as a base of the possibilities of traffic distributions in GJMA calculation. Table 2 shows 5 scenarios proposed by the government, with different traffic specializations for each airport to divide the distribution of traffic.

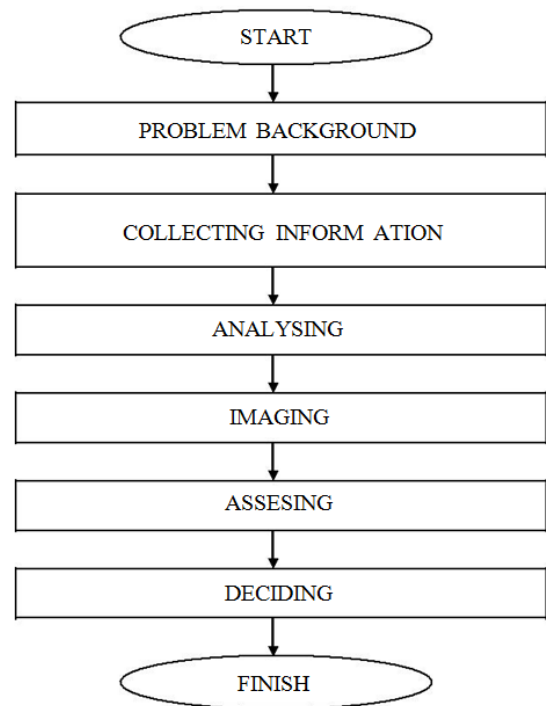


Figure 1. Research process.

Table 2. Government Scenarios (JIC, 2011)

Scenario	SHIA Role	NJIA Role
1	International traffic	Domestic traffic
2	Domestic traffic	International traffic
3	International and Domestic traffic	Domestic traffic
4	Domestic traffic	International and Domestic traffic
5	International and Domestic traffic	International and Domestic traffic

5.2 Traffic Distributions Scenarios Calculations

From 5 scenarios that being proposed by the government, this study suggests only scenario 3 and 5 because both scenario can accommodated all the traffic demand in GJMA in the future.

5.2.1 Scenario 3 Traffic Distribution

In this scenario, both airports will serve slightly different traffic, where SHIA will serve international and domestic traffic while NJIA only serves the domestic traffic. By serving both international and domestic traffic, SHIA will attract airlines which have an international and domestic destination, such as Lion Air, Garuda Indonesia, Sriwijaya Air, Indonesia AirAsia, Mandala Airlines and Merpati Nusantara, and it will accommodate approximately 80% of domestic traffic through all phases. Moreover, 100% of the international traffic will also concentrate in SHIA.

Therefore, in this scenario, SHIA will act as the primary airport and NJIA will become the secondary airport in GJMA and will accommodate approximately 20% of domestic traffic through all phases.

SHIA, with international and domestic traffic, will operate under its infrastructure capacity through the first phase. Starting from the second phase until the end of the third phase, where the demand in GJMA is more than 100 million passengers annually, SHIA will operate at its maximum capacity, exceeding its 87 million passenger capacity annually. Operating at its maximum capacity means SHIA cannot accommodate some of its traffic due to the capacity constraint. For NJIA, through all the development phases, the airport will operate under its capacity. Even when NJIA accommodates the incremental domestic traffic from SHIA, the airport still operates under its capacity.

In the first phase, SHIA still operates under its ATM capacity. However, starting from the second phase until the third phase, SHIA will operate over its ATM capacity. In contrast, NJIA will operate under its capacity through all the development phases. Even after accommodating the incremental ATM domestic traffic from SHIA, the airport will still operate under its capacity. For the cargo traffic, both airport infrastructures will be underutilized through all the phases.

5.2.2 Scenario 5 Traffic Distribution

In this scenario, both airports will serve the same traffic. However, because of the findings from the previous chapter, it is assumed that SHIA will become the preferred airport. Therefore, in this scenario, SHIA will become the primary airport and NJIA will become the secondary airport in GJMA.

For SHIA as the primary airport, it will probably accommodate big name airlines like Lion Air, Garuda Indonesia and Sriwijaya Air. The other airlines that might operate from SHIA are Garuda Citilink (Garuda Indonesia Subsidiary), Mandala Airlines, Indonesia AirAsia and Merpati Nusantara.

The traffic will concentrate in SHIA and make the airport utilize its infrastructure capacity. In contrast, NJIA will experience a different situation, because of the traffic being concentrated in SHIA; NJIA will operate under its capacity through all phases.

In the first phase, NJIA and SHIA can still accommodate the GJMA ATM demand. However, starting from the first year in the second phase, there will be incremental traffic from SHIA to NJIA due to the capacity constraints in SHIA. In contrast, NJIA will operate under its capacity, even after accommodating

the incremental traffic from SHIA. The cargo capacity at both airports is higher than the cargo traffic demand. Therefore, SHIA and NJIA can accommodate all cargo traffic demand.

5.3 Scenario Implications

There are several implications that arise from the traffic distribution calculation, such as the traffic volatility, underutilized airport infrastructure, traffic demand that cannot be accommodated by the airports, operational difficulties and poor service for the airport users.

6 CONCLUSION AND SUGGESTIONS

6.1 Key Findings

a) Traffic Distributions Scenarios - Findings

In scenario 3 the airport that accommodates international and domestic traffic will be operated at its full or maximum capacity and become the primary airport at GJMA. For the other airports that only accommodate domestic traffic, they will operate under its capacity and become the secondary airport.

In scenario 5, because of several reasons, such as, airlines investment at the airport, better transportation access and better market with probably same airport charge, SHIA will become the primary airport, while NJIA will become the secondary airport at GJMA.

b) Scenarios Implications - Findings

The scenario implications study shows that the current development phase proposed by the government, could cause the airports operating in GJMA to face several conditions, such as traffic volatility, underutilized airport infrastructure and traffic demand that cannot be accommodated by both airports. The airport users could also face some implications, namely fragmentation of operations and poor service quality for passengers.

6.2 Suggestions

a) Scenario Suggestions

Based on the findings from the previous section, scenario 3 and 5 are the most suitable or recommended scenarios to be implemented in the GJMA multi-airport system.

b) NJIA Development Suggestions

It is suggested that the development of the new airport should be in accordance with the capacity requirement based on the actual traffic at the airports. Moreover, the airport facilities design, such as passenger terminal

building, also should be flexible or can be easily adapted to accommodate various type and levels of traffic in the future. With this strategy, it might reduce the capital investment required and the risk of developing airport facilities that are too large for the actual traffic demand in the future.

The government should improve the surface access and the public transport service to the new airport to attract more traffic at NJIA.

c) Future Research Directions

This traffic distribution study is based on the certain variable in terms of government regulation or regulatory policy. It would be interesting if a further study was based on the uncertainty variable that might appear from the changes in the amount of overall traffic demand, airport preferences, airport ownership and airline strategy.

Since this study is based on the interim report, this report is not the government's final report for developing the GJMA airport system; in other words, there is still a possibility of changing plans for both airports. Therefore, the future study could be based on the government's final report, where new information regarding the final development of the new airport and existing airport will be provided.

A further study could also be performed on whether the country still needs two different airports to operate simultaneously in the same area, or close down the existing ones and operate the new one in a single airport system to accommodate the air traffic demand in the future. This study could be carried out using a cost benefit analysis method.

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