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Procedia Environmental Sciences 28 (2015) 324 – 329

Procedia Environmental Sciences

The 5th Sustainable Future for Human Security (SustaiN 2014)

Aircraft parking stands: proposed model for Indonesian airports

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Abstract

The purpose in this study is to analyze the optimization of aircraft parking stands, and proposed model for apron development in near future at Sultan Hasanuddin International Airport (SHIA) to achieve safety on airport operation activities. The study was conducted by collecting and analyzing data. The data were based on field survey, interviews, discussion with airport authority, official government, etc. and also from various agencies. Analytical tools applied were: regression analysis, to forecasts passenger and aircraft movements; and JICA formulas, to analyze the aircraft movement at peak hours, and number of aircraft parking stands for short, medium, and long terms period. The conclusion are: (a) the optimizing level on the apron area, especially at peak hours at SHIA depends on the aircraft service time, (b) the ability to serve the aircrafts on the apron area at peak hours as many as 17 to 22 aircraft parking stands, and need additional space as much as 24,431m^2, 39,216 m^2, and 52,354 m^2 in 2015, 2020 and 2025 respectively, (c) requirement to develop/introduce other aircraft parking stands model, (d) proposed the new apron or aircraft parking stands model as known as pier or satellite models to anticipate the increasing number of passenger and aircraft movements in the near future; while the recommendation can be included that the use of service time as effectively and efficiently at the apron area could provide better service for passengers, aircrafts.

Peer-review under responsibility of Sustain Society

Keywords: Airport; apron; aircraft parking stands

1. Introduction

According to Annex 14 of ICAO (International Civil Aviation Organization), airport is a defined of an area on land or water (including any buildings, installations and equipment), intended in a whole or in a part for the arrival,

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Peer-review under responsibility of Sustain Society
doi:10.1016/j.proenv.2015.07.041

departure and movement of aircrafts[1]. Airport planning guideline in detail is issued by ICAO and FAA (Federal Aviation Administration). In Indonesia, it is covered by the rules of the Indonesian Government Regulation No. 70, 2001 on Airport System and Transportation Decree KM 44, 2002 on National Order of Airport and CASR 139 for Aerodrome Area. Airport has two distinct areas, namely landside and airside. On the airside comprise several important parts, i.e. runway, taxiway and apron. Runway length usually depends on the size of aircraft served.

Sultan Hasanuddin International Airport (SHIA) is a gateway airport in eastern Indonesia and has been supporting and developing the economy, trade, industry and tourism. This airport is located 22 km from the city of Makassar, South Sulawesi Province, Indonesia. The number of passengers and aircrafts is increasing from year to year. The airport went through a process of expansion and development started in 2004 and completed in 2009. Passenger terminal area is approximately 10,815 m² wide with the capacity is 7 million passengers per year. Meanwhile, apron area is 78,800 m² and capacity is 17 aircraft parking stands. Runway length is 3,500 meter and width is 45 meter. Several problems occurred that terminal merely has 6 gates with avio-bridge. It cannot cope with number of aircraft parking stand using avio-bridge. Moreover, loading and unloading passengers should take bus from terminal to the aircrafts at peak hours[2,3]. The purpose of this study is to analyze the optimization of aircraft parking stands, and proposed model for apron development in the near future to achieve safety on airport operation activities.

2. Airport Facilities

Commonly, international airports have more than one runway to anticipate the increase traffic growth. Aircraft parking at apron is close to the terminal building, taxiway is connecting runway and apron. On the landside area consists of several parts, i.e., access road, curbside, parking of vehicles, terminal and its supporting facilities. Airport terminal is a place for passengers departing, arriving and transit in which there are x-ray, check-in counters; ciq (custom-immigration-quarantine) for international airport; concourse, waiting room as well as various facilities for passengers' comfort, avio-bridge; and so on.

2.1. Apron

Aircraft parking stand is aircraft parking on the apron for conducting ground services activities, accommodate more than one aircraft, perform manoeuvre safely and set through the configuration model. It depends on the size of area and number of aircrafts being served.

Type of apron according to Horonjeff/McKelvey, namely: (1) terminal apron, designed for manoeuvre and aircraft parking, easily connected to the passenger terminal facilities, used to refuel aircraft and aircraft maintenance and to load and unload goods; (2) cargo apron, used to load and unload for cargo aircraft carrying goods, cargo, mail and others without passengers; (3) parking apron, used for aircraft parking for a long period of time, should be placed as close as possible to the terminal apron; (4) service and hangar apron, is an open space to perform maintenance and repairs to the aircraft, which is located adjacent to the maintenance hangar[4].

An apron will accommodate number of aircrafts according to the calculation of the amount of each type of aircraft movements during peak hours.

2.2. Slope Requirements

Apron should be required to have sufficient slope, such that no pond of water on the apron surface, where maximum slope is 1%. The aircraft fuel loading area should be half percent of apron slope to the aircraft axis transverse to ensure the accuracy of fuel measurements. The apron slope should stay away from the terminal building, especially in the fuel filling area[5,6].

2.3. Aircraft Parking Stand Model

Aircraft parking stand consists of several models, namely: (1) linear model, gives direct entrance from the front yard to the aircraft gate position, provides high level of flexibility for terminal development, (2) pier(finger) model,