

Analysis of Apron Movement Control Coordination in Plotting Parking Stands to Support Flight Safety at Adi Soemarmo Airport Solo

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Abstract

Apron Movement Control (AMC) at Adi Soemarmo International Airport is aimed at monitoring all traffic movements in the apron area consisting of air traffic, vehicles and personnel at the airport, supervision here provides the meaning of the steps needed to prevent accidents from happening. in this case the case of a collision between the three elements forming the apron traffic, where they carry out joint activities. In addition, supervision is also intended so that traffic control can take place smoothly, if the parking stand plotting is not in accordance with the existing SOP, plotting errors will occur. This research is to find out the role of AMC in coordinating Plotting Parking Stands to support flight safety and to find out what are the constraints of AMC in coordinating Plotting Parking Stands to support flight safety at Adi Soemarmo Solo Airport. This research is a qualitative research. Data collection techniques used are observation, interviews and documentation. Observation of this study by direct observation of the handling of AMC coordination in plotting parking stands at Adi Soemarmo International Airport. The interviews in this study were Apron Movement Control (AMC) unit officers, tower unit officers and Ground Handling officers at Adi Soemarmo International Airport. Data analysis consists of data reduction (data reduction), data presentation (data display) and drawing conclusions (drawing/verification). The validity of the data using triangulation techniques. The results of this study can be concluded that the important role of AMC in coordinating plotting parking stands is very large and has great responsibility in each of its operations, one of which is regarding plotting parking stands. As well as coordination carried out by AMC with towers and ground parties. One of the obstacles faced by Apron Movement Control was the implementation of the parking stand plotting procedure carried out by AMC for the tower and ground which had to be taken by one of the parties due to communication constraints carried out by the relevant parties, because if the plane is delayed, damaged or there are many requests it must be coordinated swiftly and responsively with competent personnel as stated by AMC.

Keywords: Apron Movement Control, Plotting Parking Stand, Coordination



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INTRODUCTION

The development of the aviation industry in Indonesia has made demand from passengers increase at every airport managed by PT. Angkasa Pura I (Persero), PT. Angkasa Pura II (Persero), Airport Management Unit (UPBU), and Technical Implementation Unit (UPT). According to Law Number 1 of 2019 an airport is an area on land and/or waters with certain boundaries that is used as a place for aircraft to land and take off, board passengers, load and unload goods, and places for transfers and between modes of transportation. equipped with aviation safety and security facilities, as well as basic facilities and other supporting facilities. An airport is an airfield that is used to take off and land aircraft, raise and lower passengers, as a parking area, takeoff and landing of aircraft, an airport providing facilities in an area or airside area as a place for aircraft to work or operate.

Apron Movement Control at Adi Soemarmo Airport is intended for monitoring all traffic movements in the apron area consisting of air traffic, vehicles and personnel at the airport,

supervision here gives the meaning of the steps needed to prevent collisions from occurring in this case. among the three elements forming apron traffic, where they carry out joint activities. In addition, supervision is also intended so that traffic control can take place smoothly, if the plotting of the parking stand is not in accordance with the existing SOP, plotting errors will occur. In improving flight safety, AMC employees are also required to have high performance in carrying out their duties and responsibilities efficiently and effectively in order to create overall company productivity, so that the company can survive in global competition. AMC officers who should clearly understand that parking stands must be filled and empty at certain times, officers also need to carefully observe the movement of the apron on the air side and still do not understand the regulations in the apron.

The AMC Unit has the task of being in charge of flight operations service activities, management of the apron and all interested persons in the airside area. In Air Side Operations Management (AMC) coordination in services consisting of aircraft parking arrangements, Docking and De-Docking, Visual Docking Guidance System (VDGS). VDGS is a device that visually guides an airplane towards a parking lot. Auto Visual Docking Guidance System (AVDGS). AVDGS adalah peralatan yang memandu pesawat terbang secara visual menuju tempat parkir secara otomatis. Push Back dan Start Engine, marshalling, follow me car, pengawasan kendaraan di sisi udara, penerbitan izin kendaraan operasional dan Ground Support Equipment GSE, penerbitan TIM apron, kebersihan apron, penanganan tumpahan bahan bakar (Fuel spillage).

Aviation safety is not only focused on aircraft activities but passenger safety must also be taken into account. When the plane enters the apron (aircraft parking area), the safety of hundreds of passengers is in the hands of the Apron Movement Control (AMC) or the activity control unit for the apron area. The operational activities of the Apron Movement Control (AMC) work unit at Adi Soemarmo International Airport according to observations made by researchers still found intervention from the Aerodrome Control Tower (ADC), this was seen when plotting parking stands, where there were still discrepancies between the plotting provided by the Apron Movement Control (AMC) unit and the information provided by the Aerodrome Control Tower (ADC) unit to the pilot. Information discrepancies lead to miss-communication/miss-coordination between the Apron Movement Control (AMC) unit and the Ground Handling (GH) in providing information on the use of parking stands.

Aviation safety is not only focused on aircraft activities but passenger safety must also be taken into account. When the plane enters the apron (aircraft parking area), the safety of hundreds of passengers is in the hands of the Apron Movement Control (AMC) or the activity control unit for the apron area. The author found that there was a connection that occurred regarding the operational activities of the Apron Movement Control (AMC) work unit at Sultan Hasaudin International Airport, Makassar, according to observations made by other researchers, there was still intervention from the Aerodrome Control Tower (ADC), AMC often had problems with movement. on the apron, an AMC must work as a team work so that safety is achieved. However, the AMC unit is currently in a state of shortage of personnel and with a workload that can be considered large and with a minimal number of officers and a more workload leading to service sector, so that in practice employees often carry out work assignments with the same problem, namely the inaccuracy of recording block on and block off times for arriving and departing aircraft at parking stands 10,9 and 8 even though the timeliness of block on and block off the plane can affect the accuracy of how much the parking fee should be paid by each airline or ground handling

There were many miscommunications between Tower officers and AMC officers, for example in the case (18 September 2022) AMC officers plotted the parking of the Citilink A320 aircraft which

had become a customer at parking stand number 4 but due to a request from the airline Batik B737-900. Tower provided information that the batik would land at parking stand number 4, then the AMC officer gave information back to Tower and re-plotted it while the Natra officer was already in plotting position number 4 because it was in accordance with Citilink A320's usual on 4, resulting in chaos which could then be resolved by how to change it back Citilink A320 remains at Parking stand 4 and Batik B737-900 at 2A as usual, luckily the position of the aircraft is still holding otherwise it might be more chaotic.

Therefore the AMC officers plotted/provided parking stand information to the tower which was continued by the pilot, then the tower would guide them to the parking stand. Therefore, it is very important for AMC officers to know in real time the parking stand slot on the apron if the plotting of the parking stand at Adi Soemarmo Solo airport is not suitable resulting in an incident. The aims of this study are as follows: To find out the role of AMC in coordinating Plotting Parking Stands to support flight safety at Adi Soemarmo Solo Airport. To find out what are the AMC's obstacles in coordinating Plotting Parking Stands to support flight safety at Adi Soemarmo Solo Airport.

Theoretical Basis

Airport

According to Annex 14 of ICAO (International Civil Aviation Organization) airport is a certain area on land or water (including buildings, installations and equipment) which is intended either in whole or in part for the arrival, departure and movement of aircraft. The definition of an airport according to PT. Angkasa Pura I (Persero) is an airfield, including all buildings and equipment which are the minimum equipment to ensure the availability of facilities for air transportation for the community. According to Annex 14 of ICAO (International Civil Aviation Organization) an airport is a certain area on land or water (including buildings, installations and equipment) intended either in whole or in part for the arrival, departure, movement of aircraft. While the definition of an airport according to PT Angkasa Pura is an airfield including all buildings and equipment which are the minimum equipment to ensure the availability of air transportation facilities for the public.

Aprons

An apron is one of the designated areas or places at the airport for placing aircraft, lowering and boarding passengers, cargo, refueling, and carrying out maintenance and maintenance of aircraft. (Air Transportation Service of West Java Province).

Coordination

According to Brech in Hasibuan (2014), "Coordination is balancing and moving the team by giving each one a suitable location of work activities and ensuring that the activities are carried out with proper harmony among the members themselves. Coordination carried out by AMC in the AMC Quality Procedure for Every Airlines and Ground Handling for the transfer or change of aircraft parking lots, must obtain approval from the Airline Service Supervisor, then the change is submitted to Air Traffic Control so that it will be written (ATC). When transferring aircraft, Airlines and Ground Handling must maintain a reciprocal radio communication relationship with the ADC (Tower). If there is a flight with sudden notification or an irregularity flight submitted by Airlines and Ground Handling or ATC, arrangements for the placement of the aircraft are made by looking at the available parking stand allocations, including the planned placement on the apron, but must still pay attention to the type and MTOW of the aircraft.

Plotting Parking Stands

Plotting is the planning of a homonym because the meanings have the same spelling and pronunciation but different meanings (Big Indonesian Dictionary). According to the Decree of the Director General of Civil Aviation number SKEP/100/X1/1985, November 12, 1985, concerning Airport Rules and Regulations, Chapter I, article (3) explains that a Parking Stand is an area on an apron used for aircraft parking. air. A parking stand is a certain place at an airport used for aircraft parking. (AP I AMC Module)

Apron Movement Control (AMC)

According to the Annex (2004) an apron is a certain area on the aerodrome land intended to accommodate aircraft for the purpose of loading and unloading passengers, mail or cargo, refueling, parking or aircraft maintenance. The task function of the AMC unit is the work unit according to the Operational Standards for Apron Movement Control Version 1.0 PT Angkasa Pura 1 (Persero) has the function of carrying out full supervision of conditions, objects, and activities and services on the apron. In order to realize the implementation of these duties and functions, it must be supported by good facilities/equipment that are always ready for operation, skilled personnel and always ready for duty, as well as service standards in accordance with the provisions.

Aviation Safety

According to Law No. 1 of 2009 concerning Aviation that must be fulfilled by airport operators, air transportation operators, flight navigation operators, which are part of aviation safety. Aviation Safety is a condition of fulfilling safety requirements in the utilization of airspace, aircraft, airports, air transportation, flight navigation, as well as supporting facilities and other public facilities. According to Annex 13 of ICAO (International Civil Aviation Organization) concerning Aviation Accident Investigation, Aviation safety is a condition in which a flight runs smoothly from take-off to landing at its destination with no accidents or incidents. Therefore all airlines (airlines) must meet aviation safety requirements in the operation of their aircraft. In addition to safety aspects, other important aspects such as security and accidents in flight must be the main concern of airlines. This is important considering the level of security and safety will have an impact on increasing the number of accidents, these aspects are related to one another and cannot be ignored. The presence of aircraft as modern transportation is closely related to the rapid economic growth of the people who use aircraft services. An increase in the number of users of aviation services must also be accompanied by an increase in guarantees of safety and security. Aspects of safety and security in aviation must be the joint responsibility of the various parties involved.

Relevant Research

Table 1. Relevant Researchers

No	Name	Year	Title	Research Result
1	Novariani Amri	2019	The role of the Apron Movement Control Unit in ensuring flight safety at Sultan Hasanudin Airport	The results of this study can be concluded that in an effort to ensure safety on the air side of Sultan Hasanuddin International Airport Makassar, the AMC Unit carries out its duties and responsibilities by carrying out strict supervision of operational activities on the air side.

2	Willy Hermawan	2019	The Role of Apron Movement Control in Serving the Movement of Chartered Aircraft at Halim Perdana Kusuma Airport	The results of his research To arrange so that the movement of aircraft does not experience problems, a correct apron management service is needed. Meanwhile, the purpose of this apron management service is: Regulating movement with the aim of preventing collisions between aircraft and between aircraft and obstacles.
3	Aswanti Steyawati	2019	Study of Apron Monitoring by Apron Movement Control in Improving Discipline on PT Angkasa Pura I (PERSERO) Apron at Adi Sumarmo Solo Airport	The result of the author's own observation in the field is limited visualization, where as we know that at the moment Adi Soemarmo Airport has 15 parking stands, while the average visualization of apron movement control (AMC) personnel only reaches parking stand number 10, movement control (AMC) continues to be more sensitive to potential violations that can occur in the airside area of Adi Soemarmo Airport, Surakarta.

RESEARCH METHODS

Research Design

In this study the authors used a qualitative method which can be interpreted as a research method related to examining at a certain time by collecting data using qualitative data analysis. Sugiyono, (2013) explained that qualitative research methods are research methods used to examine natural object conditions, where research is a key instrument, data collection techniques are carried out in triangulation (combined), data analysis is inductive, and qualitative research results emphasize meaning rather than generalization. According to Sugiyono (2013) natural objects are objects that are as they are, not manipulated by research so that the conditions at the time of research entering the object, after being in the object and after leaving the object are relatively unchanged.

Location and Time of Research

The time used for research to conduct research on the object that is the center of attention, as well as the place of research. This research was conducted at Adi Soemarmo Angkasa Pura 1 Solo Airport. The time needed to carry out this research is in the period January 2022.

Data Types and Sources

This type of research is qualitative research, namely research in which the data is expressed in direct form and analyzed without using statistical techniques. The data obtained from the company is in the form of information both orally and in writing which acts as a support for what is needed to support the discussion. This research uses 2 types of data, namely primary data and secondary data.

1. Primary Data. Primary data, namely data derived from information obtained directly from the results of interviews with AMC officers by asking questions to AMC personnel using structured questions and direct observation. This interview was conducted with 3 informants, namely, Airline Supervisor Service, Aerodrome Control Tower (ADC), and Ground Handling as well as the results of observations in the form of observation sheets covering activities in the field from AMC officers.
2. Secondary data. Secondary data is data obtained indirectly, namely from literature studies, books that contain matters that have been studied, relevant research, in this study in the form of documents regarding parking stand plotting.

Data Collection Technique

1. Observation. Sugiyono (2013) defines observation as systematic observation and recording of the elements that appear in a symptom on the object of research. The object observed in this study is the activities in the field of AMC officers.
2. Interview. Interviews can be conducted in a structured or unstructured manner and can be conducted face to face or by telephone (Sugiyono, 2013). In this study the interviews were conducted in a structured manner. The resource persons in this study were AMC officers, Tower officers, and Ground Handling officers.
3. Documentation. Sugiyono (2013) defines documentation as something that is used to obtain data and information in the form of books, archives, documents, written numbers and pictures in the form of reports and information that can support research. The documentation that will be presented in this study is in the form of AMC documents, photos during the activity.

RESEARCH RESULTS AND DISCUSSION

This study discusses the coordination of plotting parking stands to support flight safety. This chapter is the part that answers the background problems in chapter 1 according to the problems described in the chapter. The researcher conducted the research on February 19 to February 29, approximately 10 days, for the purposes of observation, interviews, and documentation, some of which were taken when researchers carried out OJT in the period September - October, then researchers were interested in raising the title "Analysis of Apron Movement Control Coordination in Plotting Parking Stands to Support Aviation Safety at Airports Adi Soemarmo Solo. The author chose three sources from 2 AMC officers and one ground officer, with each position taken from AMC supervisor, AMC controller, and ground staff, so that the observations and interviews carried out were carried out properly. For the author's own observation based on AMC quality procedures. In his research the author also includes some documentation. After all the data was collected by means of observation, documentation and interviews, which were conducted directly on February 19 2023 the author obtained research results regarding AMC coordination analysis in plotting parking stands to support flight safety at Adi Sumarmo Solo Airport

Discussion

Plotting parking stands is a parking plan planned by AMC, at Adi Sumarmo Airport apron officers have an important role in parking planning, where ground officers ask the number of available parking slots, then AMC will inform the ground, and inform the tower. The role of the AMC is very influential on a flight, therefore all coordination on the apron cannot be separated from the important role of AMC, if there are other officers who want to make a decision, it must be re-confirmed so that there are no mistakes that cause chaos.

How is AMC's coordination in Plotting Parking Stands to support flight safety at Adi Soemarmo Solo Airport?

In carrying out Plotting Parking Stand services, AMC (Apron Movement Control) officers at Adi Soemarmo International Airport have a total of 9 officers with a work system per shift divided into 2 to 3 people. The number of parking stands at Adi Soemarmo Solo International Airport has 11 Narrow body and wide body aircraft parking spaces, namely numbers: 1,2,3,4,5,6,7,8,9,10,11,12 while number 13, 14, and 15 are used for unscheduled parking such as hajj planes or chartered planes. Aircraft parking placement is carried out by AMC (Apron movement control) in coordination with towers and ground handling (Source: AMC Quality

Procedures at Adi Soemarmo International Airport). In determining parking stands, the AMC (Apron movement control) unit at Adi Soemarmo International Airport considers the number and determination of stands according to the type of aircraft. The goal is to get the use of Parking Stands effectively and efficiently to provide comfort for passengers and aircraft safety at Adi Soemarmo International Airport.

The AMC (Apron movement control) officer also provides initial information to the operator and ground handler regarding the possible location (stand) of the incoming aircraft. The following is the realization of parking stands at Adi Soemarmo International Airport. Based on the AMC Worksheet SOC data from August to September 2022, the lowest Plotting Parking stand realization figure occurred on September 6 2022 and the highest occurred on November 9 and 10 2022 (Source: Observation Results at Adi Soemarmo International Airport). The important role of the AMC at Adi Soemarmo International Airport in plotting the Apron Movement Control (AMC) parking stand is very important for flight operations, because the functions and duties of the AMC unit are very useful in every aircraft that will arrive or depart. AMC is important in every flight because it has created or maintained order, smoothness, security and safety of flights and especially for every party operating in the apron environment or carrying out activities required to understand the rules and procedures that have been set. One of the important roles of AMC is planning parking.

Determining the allocation is of course the AMC unit that has determined each aircraft that will arrive, then before the plane arrived, ATC had direct contact with the pilot who was soon arriving at the airport. The AMC coordination itself was very neat, especially the coordination with ATC (Air Traffic Control). what they discussed was the number of Parking Stands for the upcoming planes. For the arrival of the aircraft, AMC officers must be ready to operate Aviobridge or Garbarata. As a form of service to future passengers, in operating an Aviobridge, you must have a license to be able to operate an Aviobridge. After the plane arrives, AMC personnel record the parking stand on the Apron movement sheet and match the flight number, schedule of arrivals, departures and type of aircraft (Source: Interview Results of Ground Officers at Adi Soemarmo International Airport). "The coordination was carried out, namely first the ground asked the parking slot to AMC, then AMC plotted according to the existing slot and coordinated with the tower, then the ground officer went to the field to assist the aircraft when the aircraft was taking off or landing." (Source: Ground Officer Interview Results at Adi Soemarmo International Airport).

Arrangement of the apron management air traffic service unit or with the aeronautical information service unit at the Adi Soemarmo International Airport ATS unit or at the airport ATS unit that serves it to ensure the mechanism and coordination of aircraft parking arrangements. Mechanism and coordination of aircraft parking arrangements The AMC Unit at Adi Soemarmo International Airport is obliged to:

1. Deliver parking stand allocations for each aircraft that comes to the Tower at least 15 minutes, and/or changes thereof at least 5 minutes before the aircraft is expected to land (ATA).
2. Changes in parking allocation can be given until the aircraft lands before entering the apron.
3. Inform at least 30 minutes before the implementation: aircraft repositioning, aircraft transfer from the apron to another location through the maneuvering area, plans for the movement of vehicles, goods or people who will go through the maneuvering area, and plans for aircraft running engines on the apron or maneuvering area.
4. Ensure the path or route of each aircraft that performs pushback or parking is free from any obstacles.

5. Provide a new parking stand if there are RTA/RTB aircraft
6. Notify Tower of any matters that may interfere with the smooth running of aviation safety duties and services in the movement area.
7. Guiding aircraft that do not have representation and/or ground handling at airports using AMC vehicles.
8. Can close certain parking stands (Source: AMC MODULE AP1).

What are the obstacles faced by AMC in coordinating Plotting Parking Stands to support flight safety at Adi Soemarmo Solo Airport?

The obstacle faced by Apron Movement Control in coordinating parking stand plotting is that AMC personnel have a big responsibility when supervising plotting parking stands on the apron and ensuring that everyone on the apron follows the procedures that have been in effect, for safety and efficient work. When AMC personnel carry out plotting strictly and strictly, ground officers and others must follow AMC procedures, therefore every activity on the apron must be carried out under strict supervision from these AMC personnel. (Source: Interview Results of Ground Handling Officers at Adi Soemarmo International Airport). " (Wuryono, interview, 24 February).

However, when the plane experiences problems such as damage, delays, and there is a VVIP plotting request, AMC will deal with it and park it according to the conditions in the field, airlines cannot make requests because only AMC can decide or carry out plotting according to existing procedures so that this does not happen. a mistake, but back again because the plotting that was made only as a plan will change depending on the conditions in the field which require that all parking stands on the apron must always coordinate well with AMC, tower and ground and no other officer besides AMC takes part in managing what has been determined except for requests submitted by VVIP. So that it does not harm any party who wants to operate when the plane is coming and taking off. (Source: Results of Observations and Interviews with AMC Officers at Adi Soemarmo International Airport). "Airlines can't req, mba, airlines follow our plottingan mba, req is usually from the TNI protocol mba, there is no time measure, the most important thing is still being able to coordinate for parking changes" (Didik haryadi, Interview, 26 February 2023).

CONCLUSION

The important role of AMC in coordinating plotting parking stands is very numerous and has great responsibility in each of its operations, one of which is regarding plotting parking stands. As well as coordination carried out by AMC with towers and ground parties. One of the obstacles faced by Apron Movement Control is the implementation of the parking stand plotting procedure carried out by AMC for the tower and ground which should be taken by one of the parties due to communication constraints carried out by the relevant parties, because if the aircraft is delayed, damaged or many requests must be coordinated swiftly and responsively with competent personnel as stated by AMC.

From the discussion and conclusions above, several suggestions can be drawn for the company and further research, as follows: For companies, this research can provide input for Adi Soemarmo Solo Airport to further improve the coordination of field employees so that something does not happen as desired. The company also must improve the quality of the apron because there are several cracks and there are puddles of water in several parking stands so that they can be repaired more quickly to further support the smooth running of the flight. But now the markings have been repainted to make the parking stand even better, all that's left is

to improve it. For further research, the results of this study only explain the meaning of AMC coordination in plotting parking stands and the role-playing carried out by the AMC unit, and only explain the coordination carried out by AMC to the ground party. If the next researcher raises the same title so that he can explain in more detail, such as being able to discuss more thorough coordination in the apron area, namely with officers who are throughout the apron so that further research is much better with more accurate data.

BIBLIOGRAPHY

- Afen Sena, Pengetahuan Dasar Apron Movement Control (AMC), 2008
- Annex 13 To the Convention on International Civil Aviation Aircraft Accident and Incident Investigation.
- Annex 14 Aerodromes. International Civil Aviation Organization. Secretary General.
- Apron Movement Control Manual PT angkasa Pura I (Persero) Tahun 2016).
- Departemen Perhubungan, 1993, "Peraturan pemerintah No. 43 Tahun 1993 Tentang Prasarana dan Lalu lintas", Jakarta.
- ICAO (International Civil Aviation Organization). 2004.
- ICAO, 2004. Aerodromes Annex 14. International Civil Aviation Organization (ICAO).
- ICAO. (2005). Aerodrome Design Manual Part 2 Taxiway, Aprons and Holding Bays, International Civil Aviation Organization, Fourth Edition 2005 Doc 9157-AN/901.
- Peraturan Direktorat Jenderal Perhubungan Udara No. KP 39 Tahun 2015 tentang Standar Teknis dan Operasi Peraturan keselamatan Penerbangan Sipil Peraturan Direktorat Jenderal Perhubungan Udara Nomor 326 Tahun 2019.
- Peraturan Dirjen Perhubungan Udara Nomor: KP 21 Tahun 2015, bahwa Personel pengatur pergerakan pesawat udara (Apron Movement Control/AMC).
- S, Sentot 2009 insiden (incident) Jakarta; kontras & legal Development Facility.
- Sugiyono (2019). Metode Penelitian Kuantitatif, Kualitatif, dan R&D. Bandung : Alfabeta.
- Sugiyono, 2013, Metodologi Penelitian Kuantitatif, Kualitatif Dan R&D. (Bandung: ALFABETA).
- Undang-Undang No.1 Tahun 2009 tentang Penerbangan yang wajib dipenuhi oleh penyelenggara bandar udara, penyelenggara angkutan udara, penyelenggara navigasi penerbangan, yang merupakan bagian dari keselamatan penerbangan.
- Undang-Undang Nomor 1 Tahun 2009 tentang Penerbangan. 2009. Jakarta : Presiden Republik Indonesia