JTUS, Vol. 02, No. 1 January 2024
E-ISSN: 2984-7435, P-ISSN: 2984-7427

Journal Transnational Universal Studies

ACTUALIZATION ANALYSIS OF SERVICE ROAD AT HUSEIN SASTRANEGARA INTERNATIONAL AIRPORT BANDUNG IN ORDER TO MEET THE SAFETY MANAGEMENT SYSTEM

Fildza Ichwan Nur Muhammad Amin[1], Suharto Abdul Majid[2]
[1]Universitas Trisakti, DKI Jakarata, Indonesia
[2]Trisakti Institute of Transportation and Logistics, DKI Jakarata, Indonesia
Email: fildzaichwan@gmail.com, samtrisakti1531@gmail.com

Abstract

Husein Sastranegara Bandung International Airport was previously an airport called Andir (Andir Airfield) during the Dutch East Indies era in 1920. As time progressed, Husein Sastranegara Bandung International Airport was managed by PT. Angkasa Pura II in 1994. Even though it has been processed by PT. Angkasa Pura II and many improvements have been made, but there are still facilities that are not available in accordance with Minister of Transportation Regulation Number KM 21 of 2005 concerning the Implementation of Indonesian National Standards (SNI) 03-7095-2005 concerning Markings and Signs in Aircraft Movement Areas at Airports as a Mandatory Standard, namely Service Road markings. The aim of this research is to provide an overview of the actualization (actual condition) of the Service Road in order to fulfill the Safety Management System at Husein Sastranegara Bandung International Airport. The research method used is qualitative, the informant validation tool uses NVivo Softwear, and data validation uses triangulation, and the tool to answer research questions uses fishbone to answer "why (epistemology)" and triangulation to answer "how (axiology)". The results of this research are that the Service Road is a marking on the apron which is mandatory due to ICAO (International Civil Aviation Organization) regulations. The Service Road at Husein Sastranegara Bandung International Airport has not yet been built so the Safety Management System is still not fulfilled, but the management of PT. Angkasa Pura II has created a Service Road design plan in accordance with KP 777 of 2016 concerning the Master Plan for Husein Sastranegara International Airport in Bandung City, West Java Province. The research recommends that Service Roads be immediately built and created in order to fulfill aviation safety according to the Safety Management System.

keywords: Service Road, Safety Management System, Aviation Safety, Husein Sastranegara Bandung International Airport

INTRODUCTION

Indonesia is the largest archipelagic country in the world located between the Indian and Pacific Oceans, Indonesia consists of thousands of islands stretching along the equator. The number of islands in Indonesia reaches more than 17,000, and these islands form a vast archipelago, some of the largest islands in Indonesia include Java, Sumatra, Kalimantan (which is shared with Malaysia and Brunei), Sulawesi, and Papua. To pass through these islands, transportation is needed.

Air transportation is one of the important means to pass through the islands in Indonesia which are widespread (Gunawan & Medianto, 2016). Indonesia has many airports on major islands and major cities, enabling good air connectivity throughout the country. Several National and International airlines provide inter-island flight services, making inter-island travel faster and more efficient (Coyle et al., 2015). Airplanes are used to connect areas that are difficult to reach by land or sea transportation, but there are also small flights or public service aircraft serving small and remote routes, helping access to more remote islands.

There are several international airports in Indonesia that are currently managed by PT. Angkasa Pura I and PT. Angkasa Pura II which is a State-Owned Enterprise (BUMN) in Indonesia.

The characteristics that characterize air transportation in Law Number 1 of 2009 concerning Aviation in Indonesia include aspects of safety, security, comfort, and speed. With so many vehicles operating on the airport side, of course, regulations are needed to ensure security, safety, smoothness, and order in traffic on the air side (Tompodung et al., 2018). These regulations are certainly not the same as those that apply on the highway, specifically for the requirements and procedures of vehicles on the air side in the Republic of Indonesia regulated in the Decree of Civil Aviation Number SKEP / 140 / VI / 1999 concerning Requirements and Procedures for Operating Vehicles on the Air Side, Regulation of the Minister of Transportation Number KM 21 of 2005 concerning the Implementation of Indonesian National Standards (SNI) 03-7095- 2005 concerning Markings and Signs in the Area of Aircraft Movement in Airport as a Mandatory Standard, Regulation of the Minister of Transportation Number PM 62 of 2017 concerning Civil Aviation Safety Regulations Part 19 of the Safety Management System, and Regulation of the Minister of Transportation of the Republic of Indonesia Number PM 95 of 2021 concerning Civil Aviation Safety Regulations Part 139 concerning Aerodrome.

In accordance with the Decree of the Minister of Transportation Number 20 of 2009, Aeronautical Information Publication (AIP) is a system or book published under the authority of the government that contains actual information needed for flight navigation and contains information that is not disseminated (Hutagaol, 2013). Aeronautical Information Publication contains information about, facilities, procedures, markings (one of which is Service Road) and signs, services at airports, and airspace. Aeronautical information consists of an integrated aeronautical information package and flight navigation maps (Hawlena et al., 2022).

Najamuddin, (2014) in a study entitled Husein Sastranegara Bandung Airport Facilities, said that the calculation of airport facilities refers to SKEP 77 / VI / 2005 concerning Technical

Requirements for Operation of Airport Engineering Facilities and passenger forecasting using moderate scenario multiple regression.

The expansion of the air side is only on the runway strip while the runway length is limited to land because there are obstacles to the city and mountain Lie and the layout of the taxiway and apron is carried out so that the distance of aircraft parking to the runway strip and the distance of wing tip to wing tip is safer in accommodating 8 aircraft. Based on this research, it is concluded that using standard references has not fully met the requirements stated in the Regulation of the Director General of Civil Aviation Number SKEP.77 / VI / 2005, concerning Technical Requirements for the Operation of Airport Engineering Facilities, including the need to expand the apron and arrange aircraft parking stands on the apron with a Nose In parking system, so that the distance of aircraft parking to the runway strip is safer, and the distance of wing tip to wing tip is safer (Kusno et al., 2019).

Meilinda & Triana, (2016) examined the Evaluation and Planning of Aircraft Parking Positions on the Apron of Husein Sastranegara International Airport Bandung. The study revealed that the increase in flights led to an evaluation to adjust the apron to the plan B 737-900 ER aircraft and the Regulation of the Director General of Hubud Number 39 of 2015. The results of the apron evaluation in existing conditions found that the apron was not in accordance with the regulations so that the apron expansion was carried out with an area of 388 m x 94 m. Frequency analysis and peak hours are used to determine aircraft movements according to departure and arrival schedule data. The results of the analysis of daily aircraft peak hours were obtained at 15.20-16.20 WIB. The best aircraft parking configuration is the angled nose-in parking type with 7 parking stands that can accommodate 10 aircraft in 1 hour. Another plan is to determine the position of the aircraft parking on the parking stand that is adjusted to the existing flight schedule. It was concluded that it is necessary to expand the apron by planning a new parking configuration covering an area of 388m x 94 m, the best aircraft parking configuration is Angled nose-in with 7 parking stands that can accommodate 10 aircraft in 1 hour. The results of planning the aircraft parking position of each airline in the new apron configuration in accordance with the arrival schedule data of PT. Angkasa Pura II, but not in accordance with departure schedule data at peak hours.

Based on the author's observations during preliminary research at the Apron Movement Control (AMC) unit of Husein Sastranegara International Airport Bandung in 2020, found that one of the markings, namely Service Road, was not available in the apron area, which caused many Ground Support Equipment officers to violate speed regulations in driving in the apron area in carrying out loading and unloading activities, Towing cars that help the aircraft parking process, and other problems that can interfere with the security and safety of traffic movements on the air side of the airport starting from passengers and officers in order to meet the Safety Management System. The author presents the impact of the unavailability of Service Road at Husein Sastranegara International Airport Bandung in the form of table 1 during the preliminary observation process from 2020 to September 2023.

Table 1 Impact of Service Road Unavailability

Impact of Service Road Unavailability	FREKUENSI (1-10)
Mobility or movement of Ground Support Equipment (GSE) vehicles into one with the movement of aircraft, it can interfere with the implementation of the Safety Management System. (Recurring occurrence)	6
Mobility or movement of Ground Support Equipment (GSE) equipment into one with the movement of aircraft, it can interfere with the implementation of the Safety Management System. (Recurring occurrence)	6
The irregularity of movement activities on the apron, it interferes with the implementation of the Safety Management System. (Recurring occurrence)	7
Ground Support Equipment (GSE) vehicles immediately enter the apron area at high speed, disrupting the safety of passengers and other officers on duty in the apron area	7
Passengers were grazed by a Ground Support Equipment (GSE) vehicle while on duty on the apron	2
The Ground Handling Officer was grazed by a Ground Support Equipment (GSE) vehicle while on duty in the apron area	2
Aircraft tires grazed by Ground Support Equipment (GSE) vehicles	1

Source: Author 2023

The data above is supported by research by Jumlad & Fajrin, (2020) who conveyed that operational activities on the apron at Husein Sastranegara International Airport are not like airports in general, this occurs due to the unavailability of Service Road in the apron area, where there are still several vehicles that make movements that are not in accordance with 14 with the provisions in Decree 140 / VI / 1999, namely the movement in the aircraft parking area is 10 km / hour. In this case, the availability of Service Road plays an important role in creating traffic comfort at Husein Sastranegara International Airport Bandung in order to meet the Safety Management System. The actual condition at Husein Sastranegara International Airport Bandung still does not meet perfect standards regarding the unavailability of one of the markings in the apron area in order to meet the Safety Management System (Putri & Fakhrudin, 2022). Evidenced by the absence of Service Road in the apron area which is one of the mandatory markings in accordance with the Regulation of the Minister of Transportation Number KM 21 of 2005 concerning the Implementation of Indonesian National Standards (SNI) 03-7095-2005 concerning Marks and Signs in the Area of Aircraft Movement at the Airport as a Mandatory Standard. So that the existence of a Service Road at Husein Sastranegara International Airport Bandung becomes an obligation or mandatory that must be obeyed to fulfill the Safety Management System, especially to meet the Regulation of the Minister of Transportation of the Republic of Indonesia Number PM

95 of 2021 concerning Civil Aviation Safety Regulations Part 139 concerning Aerodrome. The actual unavailability of Service Road at Husein Sastranegara International Airport Bandung has an impact that disrupts the Safety Management System. Based on this, this research is intended for Husein Sastranegara International Airport because it meets the location criteria that can become a research unit on the actualization of Service 15 Road at Husein Sastranegara International Airport Bandung to meet the Safety Management System managed by PT. Angkasa Pura II as an airport management agency that is the main stakeholder of the Ministry of Transportation. The unavailability of Service Road at the airport airside also occurs at airports in Papua Province. For example, Frans Kaisiepo International Airport in Biak Regency, Papua Province does not have a Service Road (KM Number 76 of 2021 concerning the Frans Kaisiepo Airport Master Plan in Biak Numfor Regency, Papua Province). The airport covering an area of 2,065,250 m2 does not have a Service Road due to the actualization of the airport master plan hampered by local government regulations. This is due to certain land factors, the completeness of Safety Management System components such as Service Road is not actualized. Overcoming these problems requires the implementation of a Safety Management System that is extra than an airport in general. Therefore, it is necessary to identify, evaluate, control, and implement maintenance of occupational safety and health programs, precisely related to Service Roads under the management of Airport Business Entities (PT. Angkasa Pura II) to avoid the adverse effects of flight activities so that the implementation of the Safety Management System runs well. This condition is very concerning and it is important to provide solutions in order to create a good Safety Management System. 16 In addition, the unavailability of Service Road also has an impact such as vehicles that move too fast or fast and are not in accordance with the provisions in Decree Number SKEP / 140 / VI / 1999 concerning Requirements and Procedures for Operating Vehicles on the Air Side, namely the movement in the aircraft parking area is 10 km / hour.

METHODS

This research uses a qualitative approach, in this case it is actually a research procedure that produces descriptive data in the form of written or spoken words of people and observable behavior (Rau et al., 2023). With this approach, the author can obtain a complete picture of the problem formulated by focusing on the process and search for meaning behind the phenomena that arise in research in the hope that the information studied is more comprehensive, deep, natural, and what it is.

In qualitative research, the author cannot determine the data correctly in the design prepared before conducting research because qualitative research does not emphasize the form of relationships between variables, but on the meaning contained in the research problem in certain contexts. The data analysis process begins by reviewing all available data from various sources, namely from observations, interviews, observations that have been written down in field

notes, personal documents, official documents, pictures, photos, and so on. In this study using data analysis methods proposed by Miles and Huberman (1992).

RESULTS AND DISCUSSION

Husein Sastranegara International Airport Bandung was once an airport named Andir (Andir Airfield) during the Dutch East Indies era in 1920. In 1961, the airport (Andir Airfield) was inaugurated as an international airport, along with the development of the aviation industry, Husein Sastranegara International Airport Bandung continued to modernize and improve facilities, these improvements included runway expansion, passenger terminal upgrades, and other supporting infrastructure developments. Furthermore, in 1994 the Transfer of Airport Management from the Department of Transportation to PT. Angkasa Pura II in accordance with PP RI Number 26 of 1994 101 dated August 30, 1994 concerning the Increase of State Capital Participation of the Republic of Indonesia into the Legal Capital of PT. Angkasa Pura II. There are still markings at Husein Sastranegara International Airport Bandung that are not yet available and do not meet the standards issued by the Ministry of Transportation. One of them is in the Aerodrome area in the apron area, namely the Service Road marking. The unavailability of Service Road markings interferes with the implementation of flight safety in order to support the Safety Management System at Husein Sastranegara International Airport Bandung. On this occasion, the author will discuss four research questions that have been listed in Chapter I in the research questions section, along with the discussion.

Why Service Road is needed at Husein Sastranegara International Airport Bandung

The first discussion is about why Service Roads are needed at airports. To answer this research question, the author uses a research tool, namely Fishbone analysis or commonly called analysis using fish bone diagrams. Fishbone serves as a tool to solve a problem by collecting and organizing possible causes, ranking the most likely causes, and studying each existing causal factor. 102 There are several factors that encourage Bandung Husein Sastranegara International Airport to provide or build Service Road markings. The following author presents in the form of a fishbone diagram.

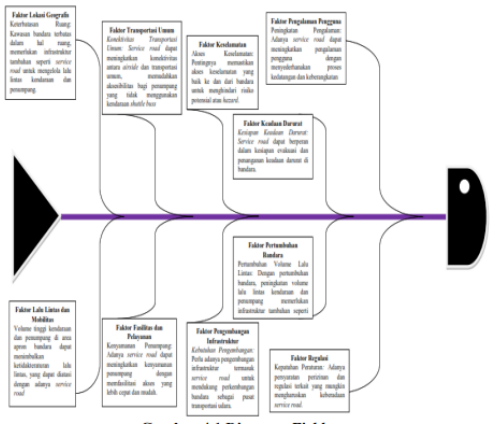

Figure 1. Diagram Fishbone

Source: Author 2023

Factors that require Husein Sastranegara Bandung International Airport to provide or build Service Road markings based on the results of the author's analysis using fishbone are:

a. Limited space in the airport area is limited in terms of space, requiring additional infrastructure such as Service Roads to manage vehicle and passenger traffic.
b. Public Transportation Factors Public transportation connectivity, Service Road can improve connectivity between airside and public transportation, facilitating accessibility for passengers who do not use shuttle buses vehicles.
c. Facilities and Service Factors Passenger comfort with the Service Road can increase passenger comfort by facilitating faster and easier access.
d. Infrastructure Development Factors There is a need for infrastructure development including Service Road to support the development of airports as air transportation hubs.
e. Traffic and Mobility Factors The high volume of vehicles and passengers in the airport apron area can cause traffic irregularities, which can be overcome by the presence of Service Roads.
f. User Experience Factors Improved Service Road Experience can enhance user experience by simplifying the arrival and departure process.
g. Airport Growth Factors With the growth in airports, the increase in the volume of vehicle and passenger traffic requires additional infrastructure such as Service Roads.
h. Emergency Factors Emergency preparedness, Service Road can play a role in evacuation readiness and emergency handling at airports.
i. Security Factors Security access, the importance of ensuring good security access to and from air cities to avoid potential risks or hazards.
j. Security Factors Security access, the importance of ensuring good security access to and from air cities to avoid potential risks or hazards.

Based on these factors, Service Road markings are indispensable at Husein Sastranegara International Airport Bandung. Service Road markings are one of the mandatory standards that must be made at Husein Sastranegara International Airport Bandung. In addition, with the Service Road marking, traffic in the apron area will be more regular, and this can reduce the occurrence

of hazards that can cause incidents and accidents, and support flight safety, so that the Safety Management System at Husein Sastranegara International Airport Bandung can be fulfilled properly (Salsabilla et al., 2023).

Actual Conditions of Service Road at Husein Sastranegara International Airport Bandung in order to Meet the Safety Management System

The actual condition at Husein Sastranegara International Airport Bandung is not available Service Road and still cannot be actualized, so the implementation of the Safety Management System in the apron area is still not running optimally. The unavailability of Service Road is caused by several factors such as limited land and permits as well as bureaucracy to the Air Force Air Force Air Force Lanud, the process is long and long because Husein Sastranegara International Airport Bandung is a civil enclave airport. The unavailability of Service Road is evidenced by the author's research, with a process of observation (direct observation in the field), interviews with 8 informants (1 key informant as Deputy Manager Airside Operation Officer, 5 informants of the Apron Movement Control unit, 1 informant of the Ground Handling unit, and 1 informant of the Safety and Risk Management unit) all of which stated that the facilities that were not available in the Aerodrome area precisely on the air side of the apron area were Service Road, and evidenced by the documentation taken by the author when making observations in the apron area of Husein Sastranegara International Airport Bandung.

The unavailability of Service Road at Husein Sastranegara International Airport Bandung causes hazards, incidents, and accidents in the apron area, including :

Tabel 2 Hazard, Incident and Accident di Area Apron

Hazard	Incident and Accident
Mobility or movement of Ground Support Equipment (GSE) vehicles becomes one with aircraft movements, officer movements, and passenger movements	Ground Handling officers and passengers were grazed by Ground Support Equipment (GSE) vehicles while on duty in the apron area
Irregularity in the use of Ground Support Equipment (GSE) equipment and vehicles, passenger irregularities in the apron area.	BTT (Baggage Towing Tractor) hit the apron bus that was standing by. This happened in 2020
The Ground Support Equipment (GSE) vehicle broke down in the middle of the apron area,	The luggage cart detached and crashed into an AMC (Apron Movement Control) office room in 2019
GSE (Ground Support Equipment) vehicles exceed standard speed	The passenger ladder fell on the jet blast, while standing by on the passenger path to go to the EPA (Equipment Parking Area) in 2019 and the passenger ladder that stood by on the passenger path fell due to the jet blast in 2018
When the parking stand that will be used for the aircraft to be parked is at parking	The passenger ladder hit the ceiling of the terminal building while being towed towards the

stand number 7, then at parking stand number 8 there is an aircraft that has been completed and ready to taxi, it is can be a very high hazard for the movement of GSE (Ground Support Equipment) vehicles themselves	EPA (Equipment Parking Area) in 2019 and the passenger ladder blocked the taxiway due to sudden damage blocking the exit path of the aircraft in 2018

Source: Author 2023

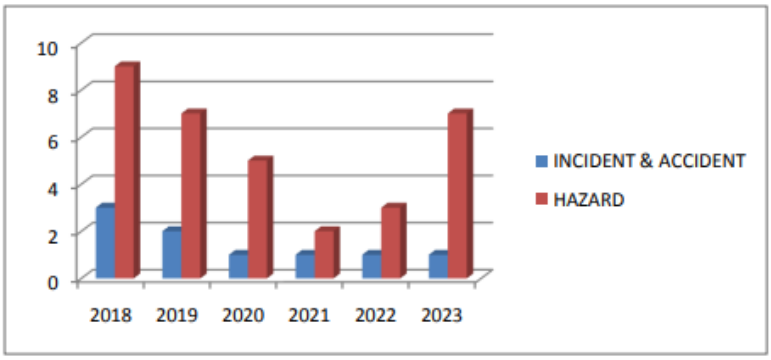

Figure 2 Hazard, Incident and Accident graphic due to unavailability of Service Road
Source: Author 2023

Hazard, Incident, and Accident due to the unavailability of Service Road for the past 5 years continued to occur until the author conducted research at Husein Sastranegara International Airport Bandung, this is very risky for flight safety at Husein Sastranegara International Airport Bandung. As with the example above, GSE (Ground Support Equipment) vehicles that drive too fast can be at risk of accidents between officers operating with passengers or GSE (Ground Support Equipment) vehicle accidents with aircraft. So this can hinder the implementation of the Safety Management System. This data is supported by research by Jumlad & Fajrin, (2020), which states "operational activities on the apron at Husein Sastranegara International Airport are not like airports in general, this happens because there is no Service Road in the apron area, where there are still several vehicles that make movements not in accordance with the provisions in Decree 140 / VI / 1999, namely movement in the aircraft parking area is 10 km / h which can cause hazard and interfere with the implementation of the Safety Management System (Melissa et al., 2017).

Hazards arising from the unavailability of Service Road at Husein Sastranegara International Airport Bandung may violate regulations issued by the Decree of the Director General of Civil Aviation Number SKEP / 140 / VI / 1999 concerning Requirements and Procedures for Operating Vehicles on the Air Side. While incident 108 (incident) and accident (accident) in the apron area can interfere with flight safety and the implementation of the Safety Management System which has been regulated in the Regulation of the Minister of Transportation of the Republic of Indonesia Number PM 21 of 2015 concerning Aviation Safety Standards, Regulation of the Director General of Civil Aviation Number KP 39 of 2015 concerning Technical and Operating

Standards Civil Aviation Safety Regulations Part 139 (Manual of Standart CASR Part 139) Volume I Bandar Air (Aerodrome), Regulation of the Minister of Transportation of the Republic of Indonesia Number PM 93 of 2016 concerning the National Aviation Safety Program, Regulation of the Minister of Transportation of the Republic of Indonesia Number PM 83 of 2017 concerning Civil Aviation Safety Regulation Part 139 concerning Airports (Aerodrome), Decree of the Director General of Civil Aviation Number PR 8 of 2022 concerning Technical Operating Guidelines of Civil Aviation Safety Regulations Part 139-26 (Advisory Circular CASR Part 139-26) concerning Aerodrome Design Manual – Visual Aids, and Regulation of the Minister of Transportation of the Republic of Indonesia Number PM 95 of 2021 concerning Civil Aviation Safety Regulations Part 139 concerning Aerodromes.

Based on aviation safety aspects in the apron area, the availability of Service Road is very important in supporting logging safety in order to meet the Safety Management System at Husein Sastranegara International Airport Bandung. The availability of Service Road 109 is mandatory as stated in the Regulation of the Minister of Transportation Number KM 21 of 2005 concerning the Implementation of Indonesian National Standards (SNI) 03-7095-2005 concerning Markings and Signs in the Area of Aircraft Movement at Airports as a Mandatory Standard, then supported by the Decree of the Director General of Civil Aviation Number PR 21 of 2023 concerning Technical and Operational Standards of Civil Aviation Safety Regulations Part 139 (Manual of Standards) CASR-PART 139) Volume 1 of the Mainland Aerodrome which states "on the apron, it is necessary to build and provide Service Roads, maneuver areas, and storage of ground equipment", and the International Civil Aviation Organization (ICAO) - Annex 14 which states in its rules "markings on the apron help guide aircraft and ground vehicles to avoid collisions and navigational errors. Such as the markings and signs in the apron area, such as Service Road markings, which are used as traffic lanes for Ground Support Equipment vehicles that will enter the apron to be regulated in accordance with standards that have been set to support flight safety (Safety Management System)".

Preveria et al., (2022) in his research said that the obstruction of Service Road markings due to the lack of Service Road standards at Radin Inten II International Airport in Lampung caused the hampering of Ground Support Equipment (GSE) vehicles that will operate and refuelling cars that will fill avtur on 110 aircraft due to many passengers boarding and descending or embark and disembark without using an aviobridge. Therefore, the need to improve the Service Road markings is very important because so that activities on the air side can run well so that when passengers get on and off or embark and disembark do not interfere with the workflow on the air side. It is recommended to PT (Persero) Angkasa Pura II Branch Office of Radin Inten II International Airport Lampung as the manager to improve the procurement or manufacture of Service Road markings according to standards in the area around the air side to meet the air side standard to ensure safety.

The author processed the interview data also assisted by NVivo Softwear to make it easier to analyze the data. The results of interviews processed with the NVivo Softwear application showed that there were 7 codes that had similar statements from all speakers by answering questions asked about the unavailability of Service Road to support flight safety in order to meet the Safety Management System at Husein Sastranegara International Airport Bandung. The following results of the author's analysis using NVivo Softwear will be displayed in the form of a diagram.

There are 7 codes from the statements of the speakers, meaning that there are 7 key sentences that are the answers to part of the formulation of this research problem. These key sentences include facilities that are not available on the apron, factors causing the unavailability of Service Road, incidents and accidents due to unavailability of Service Road, hazards arising from unavailability of Service Road, the importance of Service Road, making Service Road, and planning for making Service Road.

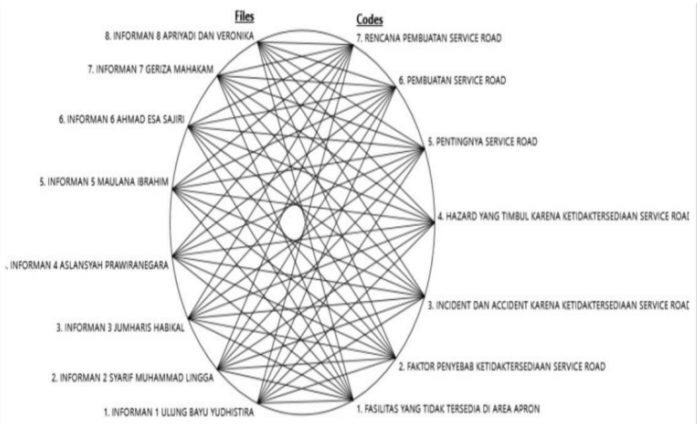

Figure 3 Coding Diagram Result
Source: Author (Nvivo) 2023

With NVivo, it can be known how the level of subjectivity, validity, and reactivity of qualitative data, especially data related to in-depth interviews. 7 coding is a part of data with a high level of subjectivity, validity and reactivity of diverse sources, strong, and able to represent experience and knowledge about the data object under study.

Given the availability of Service Road is mandatory and very urgent and important to support flight safety in order to meet the Safety Management System at Husein Sastranegara International Airport Bandung in accordance with KM 21 of 2005, the author encourages PT. Angkasa Pura II Husein Sastranegara International Airport Bandung, immediately make a Service Road in accordance with applicable regulations, so that the Actualization of Service Road at Husein Sastranegara International Airport Bandung in order to meet the Safety Management System can run well and in accordance with the regulations set by the government of the Republic of Indonesia (Sharma et al., 2020). So that flight safety can be guaranteed at Husein Sastranegara International Airport Bandung and all stakeholders and passengers feel safe and comfortable.

Why the Service Road Design Plan at Husein Sastranegara International Airport Bandung approved by the Ministry of Transportation Needs to Be Realized

The author maps what factors are related to the need for Service Road markings to be realized at Husein Sastranegara International Airport Bandung with fishbone diagrams. The following author presents it in the form of pictures

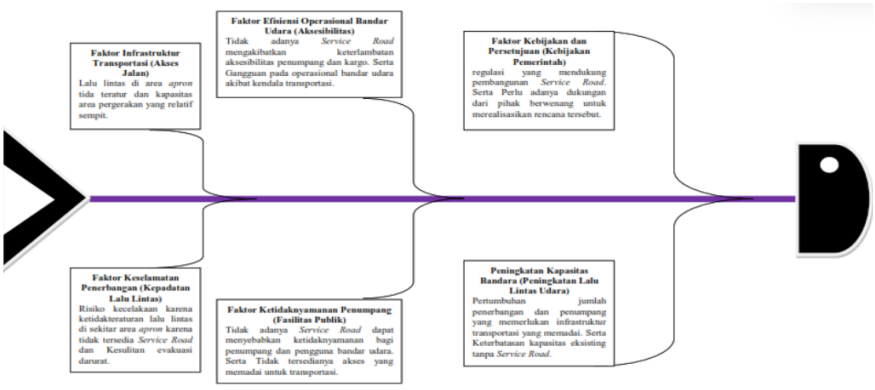

Figure 4 Diagram Fishbone
Source: Author 2023

Based on the Fishbone diagram above, the Service Road design at Husein Sastranegara International Airport Bandung approved by the Ministry of Transportation needs to be realized due to various problems related to transportation infrastructure, security and safety, airport operational efficiency, passenger inconvenience, policies and approvals, and increasing airport capacity through the construction of this Service Road. Thus, the realization of this project is expected to increase the competitiveness of Husein Sastranegara Airport and the fulfillment of the Safety Management System at Husein Sastranegara International Airport Bandung.

Design of Service Road Design Plan at Husein Sastranegara International Airport Bandung approved by the Ministry of Transportation in order to Meet the Safety Management System

The Service Road design plan at Husein Sastranegara International Airport Bandung, had previously been planned but still could not be actualized due to obstacles, one of which was limited land and was a civil enclave airport. However, based on the Decree of the Minister of Transportation Number KP 777 of 2016 concerning the Master Plan of Husein Sastranegara International Airport in Bandung City, West Java Province, it was conveyed that based on the results of the evaluation of the master plan study, Husein Sastranegara International Airport had met administrative and technical requirements. The Service Road design plan at Husein Sastranegara International Airport Bandung approved by the Ministry of Transportation in order to Meet the Safety Management System has never previously been publicly published because it is privacy.

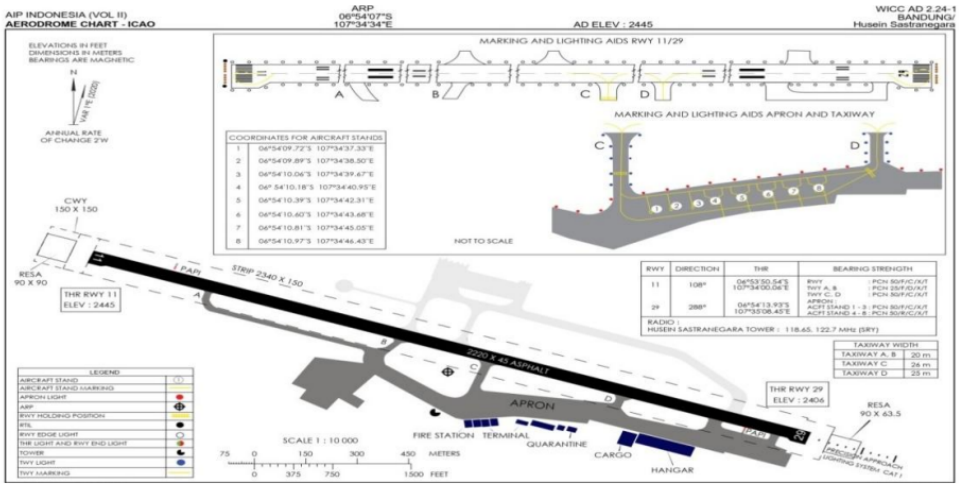

Figure 5. Layout of Husein Sastranegara International Airport Bandung before Service Road Available

Source: AIM Indonesia Ministry of Transportation RI

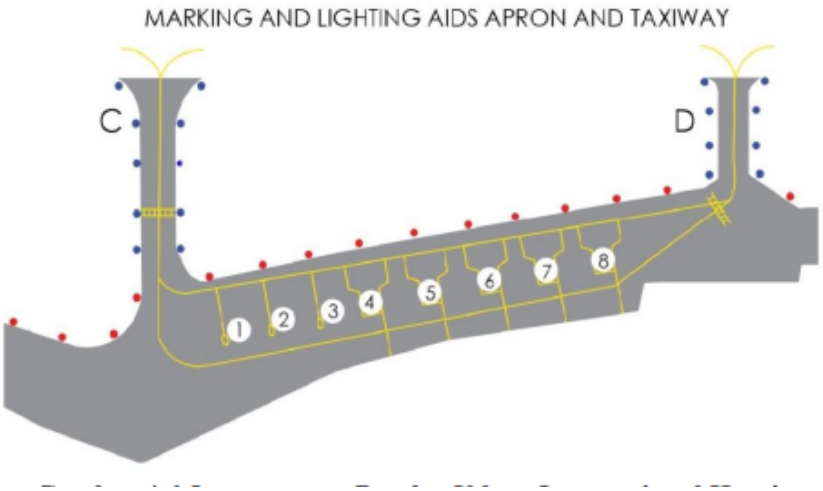

Figure 6 Apron layout of Husein Sastranegara International Airport Bandung before Service Road Available

Source: AIM Indonesia Ministry of Transportation RI

Figure 6 is the layout of Husein Sastranegara International Airport Bandung before the Service Road was available. The next discussion, the author will convey the Service Road design plan at Husein Sastranegara International Airport, Bandung, based on the Decree of the Minister of Transportation Number KP 777 of 2016 concerning the Master Plan of Husein Sastranegara International Airport in Bandung City, West Java Province. There are several important aspects in making a Service Road, including :

a. Demand Forecast for Passenger and Cargo Service Needs The plan for the construction and development of airport facilities to meet the needs of flight operations and airport services is carried out based on the development of air transport traffic as in the following table.

Table 3 Demand Forecast for Air Transport Services Husein Sastranegara International Airport

No	Description	Eksisting 2015	Tahap 1	Ultimate	Information
I	Passenger				
	International	653.046	735.588	794.503	passenger
	Domestic	2.493.761	2.805.142	3.034.404	passenger
	Total	3.146.807	3.529.740	3.828.572	passenger
II	Kargo				
	International	808.709	921.881	959.125	Ton
	Domestic	6.401.393	6.793.209	7.067.665	Ton
	Total	7.270.102	7.715.090	8.026.780	Ton
III	Pesawat				
	International	5.339	5.666	5.895	Pergerakan
	Domestic	20.563	21.822	22.703	Pergerakan
	Total	25.902	27.487	28.598	Pergerakan
IV	Passenger rush hours				
	International	315	353	353	Passenger
	Domestic	691	776	776	Passenger
	Total	1006	1.129	1.129	Passenger
V	Aircraft rush hour				
	International	2	4	4	Pergerakan
	Domestic	6	7	7	Pergerakan
	Total	8	11	11	Pergerakan

b. Facility Requirements
   1) Airport facilities planned to be built and developed as shown in the table below.
   2) Facility Requirements Airport facilities are planned to be built and developed as the table below.

c. Facility Layout and Stages of Development Implementation Land use and utilization plans for the purposes of improving operations, services, management and exploitation as well as the construction and development of airports are an integral part.

d. Land Needs and Use
   1) To carry out operations, services, management and business activities as well as airport development in accordance with the master plan, an area of approximately 145 hectares is needed.

2) The boundary of land turbidity is expressed in the airport coordinate system whose position is determined against the reference point of the airport coordinate system (intersection of the X axis and Y axis) located at geographical coordinates 060 54' 13.914" South Latitude and 1070 35' 8.418" East Longitude or at airport coordinates X = 20,000 meters and Y = 20,000 meters where the X axis is close to the runway axis which has an azimuth of 1090 47' 55.60" geographical and the Y axis through the end of the runway 29 upright straight X axis.
3) Land area requirements in accordance with point 2 above

e. Aviation Operations Safety Area
1) Landing and Takeoff Plan Area on Runway 29, height limits are determined by slope and distance through the extension of the runway axis.
2) The area around the placement of flight navigation aids
3) To erect, modify or preserve buildings, as well as plant or maintain growing objects within the Flight Operations Safety Area must meet height limits.
4) To erect a new building within the Landing and Takeoff Plan Area, it must meet the height limit by not exceeding a slope of 1.6% upward and outward starting from the end of the first surface at the respective heights of Runway 11 and Runway 29 thresholds.
5) In the Accident Hazard Possibility area up to a horizontal distance of 1,100 meters from the ends of the main surface is only used for buildings intended for the safety of flight operations and growing objects that do not endanger the safety of flight operations with height limits.
6) In areas of possible accident hazards, it is not allowed to build buildings that can increase the level of facilities in the event of an aircraft accident, including gas station buildings, factories or hazardous chemical warehouses.
7) To use land, water or air in any of the areas set out in this decree, it must comply with the following requirements:
   a) Does not cause interference with flight navigation signals or radio communications between airports and aircraft.
   b) It does not make it difficult for aviators to distinguish air sign lights from other lights.
   c) Does not cause glare in the eyes of aviators who use the airport.
   d) Does not weaken visibility around the airport
   e) Does not cause any bird hazard or in any other way may endanger or interfere with the landing, take-off or movement of aircraft intended to use the airport.
8) Exceptions to the provisions for erecting, changing, or preserving buildings in accordance with point 3 and point 4 must obtain the approval of the Minister, and meet the following conditions:
   a) It is an indispensable facility for flight operations
   b) Meet aeronautical specific studies

c) In accordance with the technical provisions of flight operation safety 120

9) For buildings in the form of immovable objects of a temporary or fixed nature that are erected or installed by persons or that have existed naturally, before the issuance of this Decree, among others, buildings, towers, chimneys, mounds, soil, transmission networks, hills and mountains which are currently obstacles are allowed as long as flight operation safety procedures are met.

10) Marking and / or Installation of Lights Based on the explanation above, regarding some important musties about the Master Plan for the Expansion of the Apron Area and the Construction of Service Road Markings of Husein Sastranegara International Airport Bandung, then the author will present the layout of the Service Road markings development plan. Here's the picture:

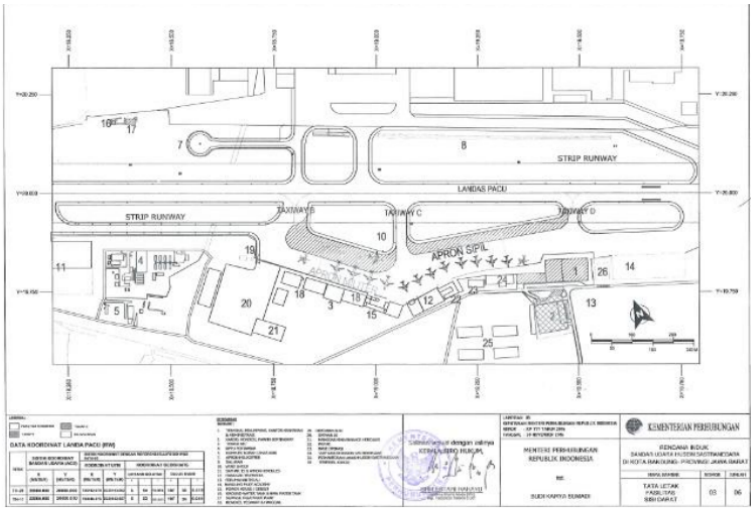

Figure 7 Current Service Road layout
Source: KP 777 Year 2016

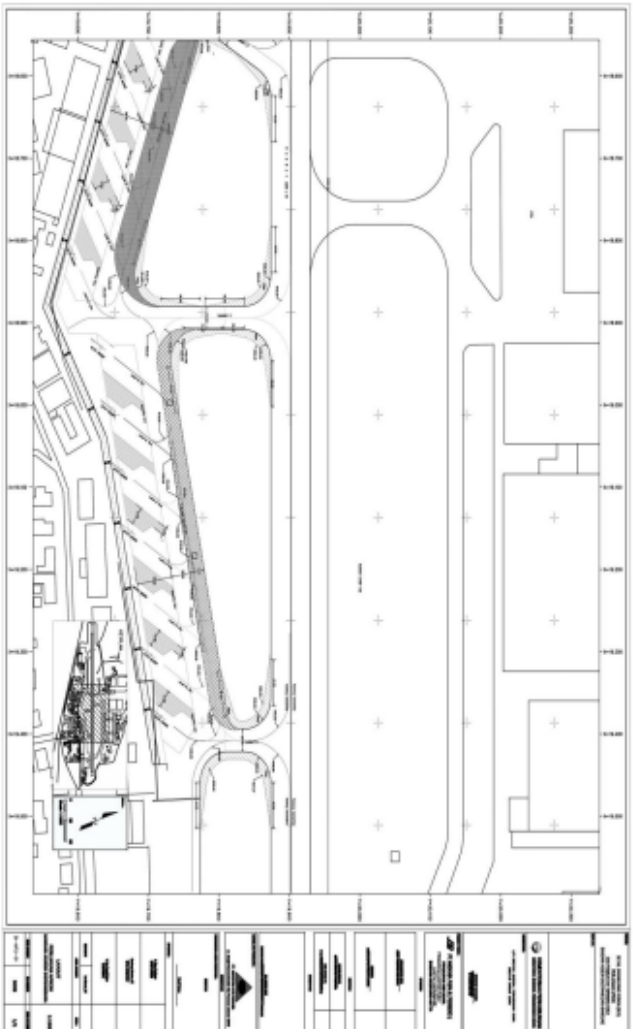

Figure 8 Current layout of Service Road
Source: KP 777 Year 2016

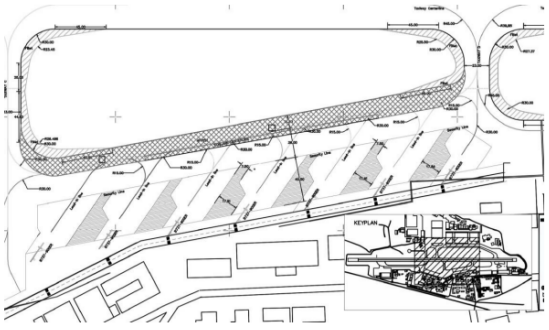

Figure 9 Service Road layout at Husein International Airport Sastranegara Bandung
Source: KP 777 Year 2016

There are differences in the layout of the old layout and the new layout of Husein Sastranegara International Airport Bandung. In the old layout there was no Service Road and the

number of parking stands was 8, with a nose in parking parking stand model. While in the new layout, Service Road is available, with 6 parking stands and with angled nose in parking stand models. Based on the discussion of two research questions, the author really hopes and encourages PT. Angkasa Pura II to continue the Service Road Design Plan that has been made in accordance with KP 777 of 2016. The construction of the Service Road is intended so that the actualization of the Service Road at Husein Sastranegara International Airport Bandung in order to meet the Safety Management System runs well and is immediately actualized. This is supported by a journal from Meilinda & Triana,(2016) which results in Husein Sastranegara International Airport Bandung needs 123 to expand the apron with a parking configuration or parking stand angled nose in model.

CONCLUSION

Based on research findings and the results of discussions in the previous chapter on Service Road and Service Road development design plans at Husein Sastranegara International Airport Bandung. The conclusion that the author can draw from this study is that Service Road is needed by Husein Sastranegara International Airport Bandung because of several factors, including geographical location factors, public transportation factors, facilities and comfort factors, infrastructure development factors, mobility factors, user experience factors, airport growth factors, emergency factors, safety factors, and regulatory factors.

Service Road at Husein Sastranegara International Airport Bandung is not yet available and has not yet been realized. So that the unavailability of Service Road interferes with flight safety in order to comply with the Safety Management System, which is regulated in PM 21 of 2015, KP 39 of 2015, PM 93 of 2016, PM 83 of Year, PR 8 of 2022, and PM 95 of 2021.

The design plan for the construction of Service Road at Husein Sastranegara International Airport Bandung really needs to be built and realized. Given the importance of factors that require Service Roads to be built and realized which include infrastructure factors. transportation, security and safety, airport operational efficiency, passenger inconvenience, policies and approvals, and airport capacity building.

The design of the Service Road construction plan at Husein Sastranegara International Airport Bandung has been made in accordance with the Decree of the Minister of Transportation Number KP 777 of 2016 concerning the Master Plan of Husein Sastranegara International Airport in Bandung City, West Java Province, and only needs to be actualized in accordance with the procedure.

REFERENCES

Coyle, J. J., Novack, R. A., Gibson, B., & Bardi, E. J. (2015). *Transportation: a global supply chain perspective*. Cengage Learning.

Gunawan, G., & Medianto, R. (2016). Analisis Konektivitas Jaringan Transportasi Udara Nasional. *Angkasa: Jurnal Ilmiah Bidang Teknologi*, *8*(2), 99–110.

Hawlena, J., Dudek, M., & Kowalska, G. (2022). *Ancillary revenues in air transport in the conditions*

of globalization.

Hutagaol, D. (2013). Pengantar Penerbangan Perspektif Profesional. *Penerbit Erlangga, Jakarta*.

Jumlad, W., & Fajrin, M. (2020). Analisis Kinerja Unit Apron Movement Control Terhadap Safety di Bandar Udara International Husein Sastranegara. *Jurnal Manajemen Dirgantara*, *13*(1), 35–41.

Kusno, K., Mubarak, M., & Moonlight, L. S. (2019). OPTIMALISASI PENGGUNAAN GROUND SUPPORT EQUIPMENT (GSE) DI EXISTING AREA TERHADAP TINGKAT KELANCARAN OPERASIONAL DI SISI UDARA BANDAR UDARA INTERNASIONAL I GUSTI NGURAH RAI BALI. *APPROACH: Jurnal Teknologi Penerbangan*, *3*(2), 31–39.

Meilinda, D. M., & Triana, S. (2016). Evaluasi dan Perencanaan Posisi Parkir Pesawat pada Apron Bandara Husein Sastranegara Bandung. *RekaRacana: Jurnal Teknil Sipil*, *2*(3), 126.

Melissa, A. C., Subagyo, T. H., Suharno, H., & Majid, S. A. (2017). Penerapan Safety Management System (SMS) Dan Kompetensi Pemandu Lalu Lintas Penerbangan. *Jurnal Manajemen Transportasi & Logistik (JMTransLog)*, *4*(1), 89–100.

Najamuddin, I. (2014). Penelitian Fasilitas Bandar Udara Husein Sastranegara-Bandung. *Warta Penelitian Perhubungan*, *26*(7), 395–408.

Preveria, L., Putro, S. H. S., & Faizah, F. (2022). ANALISIS MARKA SERVICE ROAD TERHADAP KESELAMATAN BANDAR UDARA RADIN INTEN II LAMPUNG. *Prosiding SNITP (Seminar Nasional Inovasi Teknologi Penerbangan)*, *6*(1).

Putri, C. A., & Fakhrudin, A. (2022). Evaluasi Penerapan Sistem Manajemen Keselamatan (Safety Management System) Terhadap Sumber Daya Manusia Unit Safet Management System di Bandar Udara Sultan Muhammad Kaharudin. *Jurnal Multidisiplin Madani*, *2*(9), 3561–3572.

Rau, P. R., Wu, Y., & Ieong, L.-S. (2023). Hazed and Confused: Prenatal Pollutant Exposure and CEO Risk-Taking. *Available at SSRN 4503598*.

Salsabilla, S., Rochmawati, L., & Iswahyudi, P. (2023). The Role Of The Apron Movement Control Unit In Ground Handling Operations. *Proceeding of International Conference of Advance Transportation, Engineering, and Applied Social Science*, *2*(1), 907–913.

Sharma, H. B., Vanapalli, K. R., Cheela, V. R. S., Ranjan, V. P., Jaglan, A. K., Dubey, B., Goel, S., & Bhattacharya, J. (2020). Challenges, opportunities, and innovations for effective solid waste management during and post COVID-19 pandemic. *Resources, Conservation and Recycling*, *162*, 105052.

Tompodung, G. T., Manoppo, M., & Jansen, F. (2018). Perencanaan Pengembangan Bandar Udara Gamarmalamo Di Kabupaten Halmahera Utara Provinsi Maluku Utara. *Jurnal Sipil Statik*, *6*(9).