

# OPTIMIZATION OF UNIT APRON MOVEMENT CONTROL SUPERVISION FOR THE SUITABILITY OF GROUND SUPPORT EQUIPMENT ON THE AIRSIDE OF AN AIRPORT

Muhammad Syukron Sa'dan Akmala<sup>1\*</sup>, Slamet Hariyadi<sup>2</sup>, Meita Maharani Sukma<sup>3</sup>

<sup>1,2,3</sup> Politeknik Penerbangan Surabaya, Jemur Andayani 1/73 Wonocolo Surabaya Jawa Timur 60236

\*Corresponding author. Email: andanakm@gmail.com

## ABSTRACT

The final project research addresses the issue of monitoring the performance of AMC personnel on the airside at Mutiara Sis Al-Jufri Airport in Palu. It highlights that many Ground Support Equipment (GSE) vehicles exceed their operational age limits, increasing the risk of hazards and maintenance problems, such as oil leaks in the apron area. This issue is attributed to insufficient supervision by AMC personnel regarding the condition of GSE vehicles. To address this, the study emphasizes the need for enhanced supervision by AMC personnel to ensure optimal monitoring of GSE conditions. The research employs a qualitative descriptive method, referencing PM 91 of 2016, which sets age limits for ground support equipment. According to Article 3, GSE is categorized into two age groups: those up to 10 years old and those up to 7 years old. Data was collected through observations, interviews, and documentation. The study concludes that to resolve the identified problems, AMC personnel quality should be improved through training and certification, and garbarata operations should be outsourced to a qualified third party.

**Keywords:** Optimization, Supervision, Apron Movement Control, Ground Support Equipment, Mutiara Sis Al – Jufri Airport

## 1. INTRODUCTION

The increasing demand for safe and efficient transportation services has led to a rise in air travel. As air traffic continues to grow, the development of airport infrastructure capable of adequately supporting air transportation services becomes crucial (Jansen et al., 2017). Air travel is favored for its time and energy efficiency, making it the preferred mode of transport for people and goods (Vernanda Dwi Sasqia Putri & Suprapti Suprapti, 2022).

Mutiara Sis Al-Jufri Airport, located in Palu, Central Sulawesi, is a Class I airport managed by UPBU (Airport Management Unit). It was formerly administered by the Donggala Regency Government. In 1954, the Central Sulawesi Provincial Government and the Donggala Public Works Department established an airfield named "Masowu," a term in the local Kaili language meaning "dusty," reflecting the airfield's condition during aircraft landings. In 2014, the airport was renamed from Mutiara Airport to Mutiara Sis Al-Jufri Palu, as per Minister of Transportation Decree No. KP 178 of 2014. The name Sis Al-Jufri honors a notable figure from Central Sulawesi known for his contributions to education and

resistance against colonialism in Indonesia. The management of Mutiara Sis Al-Jufri Airport falls under the Directorate General of Civil Aviation, and by Ministry of Finance Decree No. 273/KMK.05/2017 dated March 13, 2017, it has been designated as a BLU (Public Service Agency) (Barimbing & Purnama, 2023).

With the expansion of flight routes in Indonesia, especially in Central Sulawesi, Mutiara Sis Al-Jufri Airport has become a significant hub for air transportation in eastern Indonesia. As an airport management unit, it is responsible for providing airport services (Paendong, 2020). To ensure these services, the airport must have facilities that support safe and secure flight operations and passenger services (Muamar Sabilul Muttaqin, 2022).

The increase in flight operations at Mutiara Sis Al-Jufri Airport has led to higher movement of equipment and personnel on the apron or airside. Consequently, there is a need for more intensive supervision by the Apron Movement Control (AMC) unit to ensure safety and security in airside operations, particularly concerning the movement of ground handling personnel and Ground Support Equipment (GSE). PT. Global Sky Aviation

manages ground handling and GSE services at the airport.

Ground Support Equipment is regulated by established guidelines, including operational age limits outlined in PM 91 of 2016. Article 3 of this regulation categorizes GSE operational ages into two groups: up to 10 years and up to 15 years (Rahimuddin & Oktovianus Bryan Debby Sesa Tukan, 2023). However, field observations reveal violations in ground handling operations, particularly regarding GSE, which includes equipment not meeting standards or exceeding operational age limits due to suboptimal supervision by the AMC unit (Irfan & Mutmainnah, 2018).

The Apron Movement Control unit, part of the Airside Operations Division, oversees various aspects of airside operations, including aircraft movement, vehicle traffic, cargo, personnel, airside cleanliness, wildlife management, GSE placement, and flight data recording and distribution. Therefore, to enhance the performance of the AMC unit in supervision, innovative solutions are needed to develop an effective operational system.

This study addresses three main research questions: first, how does the AMC unit monitor the suitability of Baggage Towing Tractors (BTT) and Aircraft Towing Tractors (ATT) at Mutiara Sis Al-Jufri Airport; second, what is the current condition of BTT and ATT at the airport; and third, what factors contribute to inadequate maintenance of BTT and ATT by GSE operators? The aim of this research is to identify and propose solutions to these issues to improve the quality of GSE supervision and maintenance on the airside at Mutiara Sis Al-Jufri Airport.

## 2. LITERATUR VIEW

### 2.1 Airport

Airports are specialized transportation facilities designed for the landing, takeoff, and parking of aircraft. They serve as central hubs for aviation operations, offering essential amenities for the departure and arrival of passengers and cargo. Key components of an airport include runways, passenger terminals, aprons for aircraft parking, and cargo handling facilities. Airports are also equipped with supporting infrastructure such as air traffic control towers, operational coordination centers, and security facilities to ensure smooth and safe flight operations. Additionally, airports often provide ground transportation services, including taxis, buses, and car rentals, to facilitate passenger travel to and from the airport. Given their critical role in linking air and ground transportation, airports are a vital element in the global transportation system (Tandibua D. B. & Widagdo, 2023).

According to Annex 14 of the International Civil Aviation Organization (ICAO), an airport is defined as a designated area of land or water used, either regularly or temporarily, for the takeoff, landing, and operational activities of aircraft. This definition encompasses all facilities related to aviation, such as runways, aprons, passenger terminals, and other support services. Annex

14 ICAO also sets international standards and guidelines for airport design and operations, covering aspects such as runway lighting, cargo handling, and flight safety management. Thus, the definition of an airport in the context of Annex 14 ICAO highlights the essential role of airports as aviation activity centers that must adhere to international standards to ensure safe and efficient flight operations.

### 2.2 Optimization

Optimization derives from the term "optimal," which signifies the highest, best, or most advantageous state (Kamus Besar Bahasa Indonesia, 2011). The concept refers to the process of making something as good, high, or perfect as possible. It involves actions, processes, or methodologies aimed at enhancing the performance, functionality, or effectiveness of a design, system, or decision to achieve the highest possible standards.

According to the Oxford Dictionary (2008), "optimization is the process of finding the best solution to some problem where 'best' accords to pre-stated criteria." This means that optimization is a process, method, and set of activities aimed at discovering the most effective solution to a problem, with "best" defined according to specific criteria.

Optimization pertains to the process of improving or adjusting to achieve the best results or the most efficient conditions. Generally, it involves identifying and implementing the most effective solutions to maximize outcomes or minimize losses. In business or technology contexts, optimization can include enhancing operational efficiency, better utilization of resources, or improving system performance. This process often requires a thorough analysis of various variables and factors affecting system or process performance. It may also involve the adoption of new technologies or methods that can boost productivity and efficiency. Overall, the goal of optimization is to achieve the best possible results by effectively utilizing available resources, thereby supporting established goals or needs.

### 2.3 Unit Supervision

Supervision encompasses all activities aimed at ensuring that tasks are performed in accordance with established plans, policies, and regulations (Siagian, 2003). It is a management function that leaders in all units or work groups must implement to oversee the execution of duties by employees according to their primary responsibilities. Effective supervision, particularly through built-in controls, aims to prevent deviations during task execution. The likelihood of errors or deviations largely depends on the employees' skills and the guidance they receive from their supervisors. Employees who receive regular direction or mentoring are generally less prone to mistakes compared to those who do not.

Unit supervision is a process involving the monitoring, evaluation, and control of an organizational unit's activities and performance. The primary goal is to ensure that the unit operates in line with established

standards, policies, and procedures. This process includes overseeing daily tasks, meeting targets, resource utilization, and regulatory compliance. Additionally, unit supervision involves identifying and addressing potential risks or issues that could impact performance. By implementing effective supervision, organizations can ensure accountability, transparency, and efficiency in task execution. It also plays a crucial role in achieving organizational goals by enabling management to identify areas for improvement and make informed decisions based on a comprehensive understanding of the unit's performance.

#### **2.4 Apron**

The apron is an airside facility at an airport designated for various aircraft ground operations. It serves as the area where aircraft can load and unload passengers, mail, and cargo, refuel, park, and undergo maintenance. Located adjacent to the terminal, the apron must be designed to meet the specific needs and characteristics of the terminal it supports. It is a crucial part of airport operations, providing the space necessary for aircraft servicing and preparation before and after flights. The apron is typically equipped with taxiways and routes that facilitate aircraft movement to and from the runway. It enables essential activities such as fueling, baggage handling, and technical services including maintenance and repairs, making it a key component for the efficient and safe operation of aircraft.

#### **2.5 Apron Movement Control (AMC)**

Apron Movement Control (AMC) is a system designed to regulate and monitor aircraft movements within the apron area. Its primary function is to ensure the safe and efficient movement of aircraft around the apron by coordinating activities such as landing, parking, refueling, and maintenance. The AMC system employs various tools, including radar, cameras, and radio communications, to oversee and direct aircraft operations. It is crucial for preventing collisions between aircraft, ground vehicles, and personnel, thereby maintaining safety and operational efficiency at the airport. AMC ensures that all apron activities are conducted smoothly and in an organized manner (Febry Wicaksono & Fatchlul Hilal, 2023).

In essence, Apron Movement Control refers to the management system that oversees aircraft operations on the apron, including taxiing, parking, and the loading or unloading of passengers and cargo. Its main objective is to maintain the seamless and safe movement of aircraft in this critical area.

#### **2.6 Feasibility**

Feasibility refers to the conditions or characteristics that determine whether something can be performed, executed, or deemed suitable according to established standards, requirements, or criteria. Broadly, feasibility assesses the ability, appropriateness, or success of an initiative in achieving objectives or meeting specific needs. The evaluation of feasibility typically involves analyzing various factors, including financial, technical,

legal, environmental, and social considerations. It also encompasses the evaluation of risks, sustainability, and the overall impact of a decision or action. Thus, feasibility serves as a crucial foundation for decision-making across various fields, such as business, technology, public policy, and investment.

In essence, feasibility pertains to the acceptability and viability of a project, activity, or plan. A comprehensive feasibility assessment examines financial, technical, economic, legal, and social aspects. Financial feasibility involves cost-benefit analysis to ensure economic viability. Technical feasibility evaluates the capability and practicality of the required technology. Economic feasibility considers the long-term economic impact and sustainability of the project.

#### **2.7 Ground Support Equipment (GSE)**

Ground Support Equipment (GSE) refers to the machinery used to assist aircraft during ground operations from arrival to departure. GSE encompasses a wide range of equipment, including those for fueling, baggage handling, passenger services, aircraft cleaning, firefighting, and emergency response. According to the Director General of Civil Aviation Decree No. SKEP/100/XI/1985, dated November 12, 1985, which outlines airport regulations, Ground Support Equipment is defined as tools essential for aircraft readiness.

Regulations governing the organization of GSE on the airside or apron are also specified in this decree. Article 33 stipulates that all GSE vehicles and equipment used for aircraft servicing must be promptly removed or stored in designated areas once the aircraft has departed.

Further, the Director General of Civil Aviation Regulation No. KP635 of 2015, dated November 16, 2015, establishes standards for Ground Support Equipment and operational vehicles on the airside.

Article 1, paragraph (6) defines GSE as equipment prepared for aircraft and passenger needs on the ground during arrival and/or departure, and for the loading and/or unloading of passengers, cargo, and mail.

#### **2.8 Age Limitations for Ground Support Equipment (GSE)**

Age limitations for Ground Support Equipment (GSE) and operational vehicles on the airside are implemented to enhance flight safety, service quality at airports, and environmental sustainability. GSE and operational vehicles are critical for various functions, including fueling, baggage handling, and passenger services.

As GSE and operational vehicles age, their performance and efficiency may decline, increasing the risk of accidents and service disruptions. Older equipment also tends to produce higher emissions, negatively impacting the environment.

The Ministry of Transportation of the Republic of Indonesia regulates the age limitations for GSE through Regulation No. PM 91 of 2016. This regulation specifies operational age limits for GSE and operational vehicles,

ensuring they remain safe, efficient, and environmentally friendly throughout their service life.

## 2.9 Violations and Administrative Sanctions in Aviation Regulations

Violations of aviation regulations involve actions that contravene established rules and laws within the aviation sector, potentially leading to risks such as accidents, service disruptions, and environmental pollution. Both individuals and organizations can commit these violations, necessitating strict enforcement to mitigate further negative impacts. Administrative sanctions are penalties imposed by the government for such infractions, ranging from written warnings and fines to the revocation of licenses.

According to Indonesian Minister of Transportation Regulation No. 30 of 2015, which outlines administrative sanctions for aviation regulatory breaches, key provisions include:

1. *Article 10*: Requires the Director to act on inspection findings of aviation violations within five working days by referring the case to the responsible unit for evaluation and sanction recommendations.
2. *Article 13*: Details the assessment of compliance levels, considering factors such as the frequency of violations, the seriousness of corrective actions, and repeat offenses.
3. *Article 14*: Addresses the evaluation of potential future violations.
4. *Article 15*: Specifies fines, with minimum penalties ranging from 250 to 1,000 penalty units (PU), moderate fines from 1,001 to 3,000 PU, and maximum fines from 3,001 to 10,000 PU.

Additionally, *Article 19* stipulates that if an operator fails to comply within 15 working days after receiving a third warning and fine, further fines may be imposed until compliance is achieved or the operator's license is suspended. *Article 20* provides the option for appealing administrative sanctions to the Director General within 14 days, with the Director General's decision being final. Lastly, *Article 21* establishes that repeated fines will be calculated based on the most recent penalty and multiplied for each month of continued non-compliance. These regulations ensure adherence and serious corrective efforts in the aviation sector.

## 2.10 Previous Research

Previous research serves as a foundation for comparison and inspiration for subsequent studies, helping researchers position their work and demonstrate its originality. This section reviews prior studies related to the current research, including both published and unpublished works. The following studies are pertinent to the examined topic:

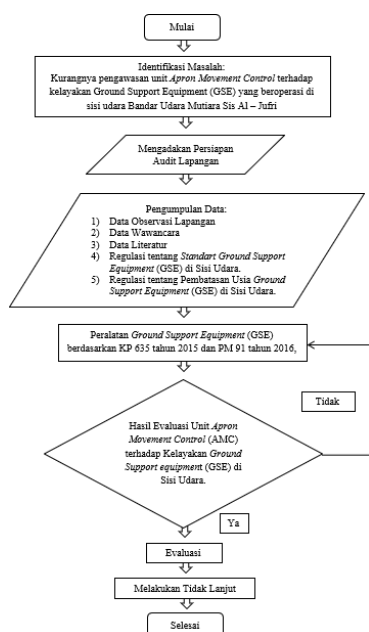
1. "*Kajian Pengawasan Unit Apron Movement Control (AMC) terhadap Kelayakan Ground Support Equipment (GSE) di Sisi Udara Bandar Udara Mutiara Sis Al-Jufri*" by Dian Bella

Tandibua and Djoko Widagdo (2024), reveals that direct supervision by AMC over GSE vehicles was inadequate due to AMC personnel focusing more on garbarata services and limited human resources. Consequently, unfit GSE vehicles continued to operate. This study, which uses qualitative methods, shares the focus on AMC supervision of GSE but differs in location, being conducted at Hang Nadim International Airport in Batam, with an emphasis on airside violations and unfit GSE due to heavy flight schedules.

2. "*Optimalisasi Pengawasan dan Penertiban Pergerakan Orang dan Kendaraan Pada Area Sisi Udara oleh Unit Apron Movement Control di Bandar Udara Depati Amir Bangka*" by Ezaki Syamtiago Deshita and Anita Nur Masyi'ah (2023), concludes that AMC performance at Adi Soemarmo Solo Airport in ensuring flight safety on the airside is crucial and well-executed, adhering to SOPs and specific instructions from Angkasa Pura. This research, also qualitative, examines the role of AMC personnel in enhancing airport safety but differs in location and focus, being conducted at Adi Soemarmo Solo International Airport, with emphasis on parking allocation, traffic supervision, and cleanliness on the airside.
3. "*Analisis Kinerja Petugas Apron Movement Control (AMC) dalam Meningkatkan Keselamatan Penerbangan di Bandara Udara Internasional Adi Soemarmo Solo*" by Vernanda Dwi Sasqia Putri and Suprapti Suprapti (2022), identifies challenges within AMC such as limited personnel, outdated Follow Me Cars, low-resolution CCTV cameras on the apron, and airside worker violations. Suggested optimizations include increasing AMC personnel, digitalizing CCTV, updating Follow Me Cars, evaluating GSE equipment, and educating airside workers. This study, also qualitative, focuses on AMC optimization for airport safety but differs in location, being conducted at Depati Amir Bangka Airport, with particular attention to issues like personnel limitations and outdated Follow Me Cars.

## 3. METHOD

This study employs a qualitative research design, initiating with the formulation of research problems and objectives. A qualitative approach is selected due to its suitability for investigations requiring initial field observations, where the research design remains adaptable to field conditions. An evaluative approach is utilized to compare events or activities against established standards, aiming to elucidate the phenomena under investigation.



**Figure 1** Research Design

This study investigates the feasibility of Ground Support Equipment (GSE) at Mutiara Sis Al-Jufri Airport, focusing on independent variables related to GSE conditions. The research population includes AMC personnel at the airport, with a sample comprising 10 AMC staff members. The research object is GSE vehicles that exceed their operational age and are inadequately maintained.

Data collection is carried out using three primary techniques: observation, interviews, and documentation. Observation aims to describe the condition and compliance of GSE vehicles in the field. Interviews are conducted in a guided but flexible manner, involving two types of questions directed at AMC supervisors, senior AMC personnel, and GSE operators. Documentation supports the data with relevant documents and photographs.

Data analysis is performed through a descriptive qualitative method, involving data reduction to simplify and categorize data according to research focus, and drawing conclusions based on observed phenomena. The study is conducted at Mutiara Sis Al-Jufri Airport during the On-the-Job Training (OJT) period from December 2023 to February 2024.

#### 4. RESULT

Inadequate supervision by Apron Movement Control (AMC) personnel has led to regulatory violations on the airside at Mutiara Sis Al-Jufri Airport, specifically concerning Ground Support Equipment (GSE). Notable issues include GSE vehicles operating beyond their operational age and insufficient maintenance. The primary cause of these issues is the lack of direct supervision by AMC staff on the airside, with personnel instead focusing on garbarata operations and flight data input.

During the research period, there were three AMC personnel on duty, none of whom were specifically assigned to oversee the airside directly. The staff's focus was predominantly on garbarata operations, as the garbarata services had not yet been outsourced. The airport operates three garbaratas, and due to closely scheduled flights, one AMC member is required to manage each garbarata for both docking and undocking procedures.

Additionally, flight data entry in the Apron Movement Control Operation Room required two personnel to handle computer data entry, manual AMC sheets, garbarata operation forms, and airside monitoring via CCTV. The remaining staff member, acting as the shift leader, was responsible for submitting flight data to superiors, operating the Follow Me Car for airside escort duties, and monitoring airside movements through CCTV.

To address the shortage of AMC personnel during peak hours, the supervisor implemented an overtime system. However, this approach primarily addressed the need for garbarata operation and did not resolve the absence of dedicated airside supervisory staff. Despite the use of CCTV for monitoring, it is insufficient for detailed oversight of GSE conditions, which requires direct field inspection. This gap has led to numerous GSE vehicles being used beyond their recommended lifespan and inadequate maintenance, increasing the risk of accidents and incidents. Hence, there is a pressing need to enhance direct airside supervision rather than relying solely on CCTV monitoring.

#### 4.1 Obsevation



**Figure 2** Aircraft Towing Tractor that uses Unsuitable Tires at Parking Stand 2

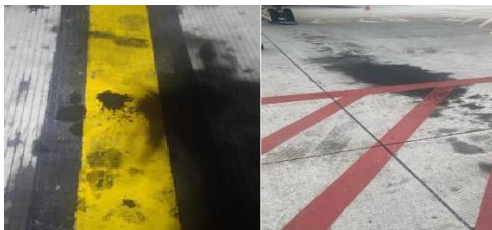
1. On December 21 in Palu, an incident involving Ground Support Equipment (GSE) was reported at Parking Stand 2, specifically concerning an aircraft towing tractor (ATT) operated by PT. Global Sky Aviasiter. Observations revealed that the tires on the ATT were no longer fit for use, indicating that they had exceeded the safe operational lifespan. The condition of the worn-out tires raised significant safety concerns, as degraded tires can compromise vehicle stability and control, increasing the risk of accidents that endanger the driver and surrounding personnel. This issue not only poses a potential threat to the equipment and airport infrastructure but can also

disrupt operations and add operational burdens. To prevent further risks and ensure safety, it is crucial to promptly replace the unserviceable tires and conduct a thorough assessment of other GSE conditions.



**Figure 3** Rusty Aircraft Towing Tractor at the Parking Stand

2. On December 27, 2023, at Parking Stand 3 in Palu, a significant issue was identified involving Ground Support Equipment (GSE), specifically an aircraft towing tractor (ATT) operated by PT. Global Sky Aviasi. Observations revealed that the ATT was in severe disrepair due to prolonged usage. The vehicle showed extensive rust on its structure, with faded paint indicating insufficient maintenance. Additionally, the seat on the ATT was nearly completely damaged, leaving only the frame. This condition led to significant discomfort for the driver, which could, in turn, affect their focus and performance during operations. The combination of a damaged seat and inadequate maintenance increases the risk of accidents and reduces operational efficiency in the apron area. Therefore, it is crucial to undertake prompt corrective actions, including replacing damaged components and enhancing regular maintenance, to ensure driver safety and comfort while maintaining optimal operational standards.



**Figure 4** Oil Drops in Parking Stand 2

3. On December 29, 2023, at Parking Stand 2 at Palu Airport, a leak was detected in a Ground Support Equipment (GSE) unit, specifically an aircraft towing tractor (ATT). Following the completion of a pushback operation, traces of oil were identified, indicating a leakage in the ATT. This incident has several serious implications. Firstly, the oil spill poses a risk of damaging apron facilities, including markings

and the pavement surface, which are essential for supporting efficient airport operations. Secondly, the oil leak creates a significant safety hazard, as the slick surface of the apron increases the likelihood of slipping incidents involving other vehicles and equipment, thereby threatening safety in the apron area. Immediate handling and repair of this leak are crucial to prevent further damage to apron infrastructure and to maintain high safety standards in airport operations. Proactive repair measures, including cleaning the affected area and fixing the leaking equipment, should be undertaken to prevent similar incidents in the future.



**Figure 5** GSE Damaged While Operating on Service Road

4. On December 26, 2023, an incident involving a Baggage Towing Tractor (BTT) belonging to PT. Global Sky Aviasi was reported at Palu Airport. The BTT unexpectedly halted while attempting to retrieve passenger baggage, causing a delay in operations at the airside. This disruption significantly affected the baggage handling process, resulting in extended waiting times for passengers to receive their luggage. The delay negatively impacted airport operational efficiency and passenger satisfaction. Not only did this incident increase the workload on airport staff, but it also prolonged passenger wait times, potentially diminishing the quality of airport services. Prompt repair of the BTT is essential to ensure smooth operations and mitigate adverse effects on passengers. Enhanced maintenance practices and routine inspections of Ground Support Equipment (GSE) are necessary to minimize the risk of similar incidents in the future and to improve both operational efficiency and passenger experience at the airport.



**Figure 6** GSE Damaged While Operating on Service Road

5. On December 23, 2023, at Palu Airport, an incident involving a Cart Pum or Trolley-type Ground Support Equipment (GSE) owned by PT. Global Sky Aviassi occurred. The equipment abruptly stopped and experienced a breakdown due to a tire detachment while handling passenger baggage. This malfunction led to significant disruptions in airside operations, resulting in delays in baggage handling. Consequently, passengers faced extended waiting times for their belongings, which potentially diminished service quality and affected customer satisfaction. Additionally, the delay placed extra operational demands on airport staff and caused subsequent flight schedule disruptions. This incident underscores the urgent need for enhanced routine maintenance and stricter inspections of GSE to ensure reliability and minimize risks that could impact operational efficiency and user experience at the airport. Implementing improved maintenance procedures and more rigorous oversight can help prevent similar occurrences in the future and enhance overall airside operations.

#### 4.2 Interviews

In this section, the author presents the findings from interviews conducted on February 19, 2023, with five individuals regarding the suitability of Ground Support Equipment (GSE) at Mutiara Sis Al-Jufri Palu Airport. The interviews involved two distinct types of questions: the first type was directed at Mr. Khalid, Mr. Aladin, and Mr. Hendra, who are supervisors, Senior AMC, and Junior AMC, respectively, while the second type was aimed at Mr. Kasril and Mr. Rosyid, the GSE operators at the airport.

During the first type of interview, the initial question addressed whether the supervision and responsibility for airside operations, particularly concerning vehicles on the airside, fall within the Apron Movement Control personnel's duties. All three informants, Mr. Hendra, Mr. Aladin, and Mr. Khalid, affirmed that these responsibilities are indeed part of their roles. Regarding the system for overseeing airside vehicles, Mr. Hendra

indicated that monitoring is conducted through CCTV within the office, whereas Mr. Khalid noted that direct supervision is also performed. Mr. Aladin added that direct supervision occasionally occurs when they are operating the jet bridges.

For the third question, which asked whether GSE vehicles must adhere to specified age limits and receive proper maintenance, all three informants agreed that this is essential for ensuring safety and operational efficiency at the airport. However, when questioned about the frequency of encountering unfit GSE vehicles, Mr. Hendra, Mr. Khalid, and Mr. Aladin reported that such vehicles are often found, particularly during peak hours. These vehicles continue to be used because they are managed by PT. Global Sky Aviassi, servicing Lion Air and Batik Air flights. They are compelled to use these vehicles due to the high flight schedule density.

The informants noted that the use of unfit GSE vehicles impedes airside operations and causes various losses. Despite regulations on vehicle age limits outlined in PM 91 of 2016, challenges in airside supervision persist. This is due to additional duties assigned to AMC personnel, such as operating jet bridges and inputting flight data. For short-term solutions, the informants suggested promptly addressing unfit GSE vehicles, while long-term solutions include outsourcing jet bridge operations and increasing personnel if AMC staff continue to bear this responsibility.

In the second type of interview, GSE operators Mr. Kasril and Mr. Rosyid reported experiencing the operation of old and unfit GSE vehicles. They reported discomfort and reduced focus while operating these vehicles, but continued to do so due to circumstances such as tight flight schedules and prolonged vehicle repair processes. As a result, their performance was less than optimal, and they recognized the risks associated with using unfit vehicles. Mr. Kasril had received a warning from AMC personnel during an oil leak incident, whereas Mr. Rosyid had not received any warnings. This indicates that airside supervision remains inadequate.

#### 4.3 Documentation

The documentation reveals that the inadequate number of AMC personnel, most of whom are elderly, has led to suboptimal supervision of Ground Support Equipment (GSE) at Mutiara Sis Al-Jufri Airport, ultimately resulting in regulatory violations on the airside. Currently, the AMC unit comprises a total of 10 personnel, divided into two shifts, each consisting of three members. Each shift is led by a team leader with expertise in AMC. However, data indicates that one member has not renewed their license, and five others lack the required competency licenses in AMC, despite the legal requirement under Law No. 1, Article 222 of 2009, which mandates that all personnel hold a competency license or certificate.

**Table 1.** List of AMC Members at Mutiara Sis Al-Jufri Airport Palu

NO	Jabatan	Formasi
1	Supervisor AMC	1 orang
2	Pelaksana senior	1 orang
3	Pelaksana junior	2 orang
4	P2K	6 orang
<b>Jumlah keseluruhan</b>		<b>10 orang</b>

Furthermore, in the absence of a third party to operate the jet bridges, AMC members are burdened with operating three jet bridges simultaneously. This situation significantly hampers airside supervision, particularly given the high volume and close scheduling of flights utilizing the jet bridges. Supervision is limited to CCTV monitoring, leading to inadequate oversight of GSE conditions. At Mutiara Sis Al-Jufri Airport, two companies, PT Global Sky Aviassi and PT Pratitha Titan Nusantara, handle GSE services, operating a total of 91 GSE units.

**Table 1.** The number of GSEs at Mutiara Sis Al-Jufri Airport.

No	Peralatan GSE	PT. Global Sky Aviassi	Lion Air	PT. Pratitha Titan Nusantara
1.	Aircraft Towing Tractor (ATT)	2 unit	-	1 unit
2.	Passenger Boarding Stair (PBS)	6 unit	3 unit	3 unit
3.	Baggage Towing Cart (BTT)	4 unit	-	2 unit
4.	Baggage Cart (BCT)	30 unit	-	12 unit
5.	Aircraft Tow Bar (ATB)	3 unit	3 unit	3 unit
6.	Ground Power Unit AC/DC (GPU)	1 unit	2 unit	2 unit

7.	Gas Turbin Compressor (GTC)/ASU	1 unit		2 unit
8.	Belt Conveyor Loader (BCL)	3 unit		2 unit
9.	Lavatory Service	1 unit		1 unit
10.	Water Service	1 unit		1 unit
	Jumlah:	52 unit	8 unit	31 unit
		Jumlah : 91 unit		

With such a large number of GSE units, AMC personnel at Mutiara Sis Al-Jufri Airport are overwhelmed with supervising all vehicles. As a result, many unfit vehicles escape scrutiny and continue to be used. For example, Aircraft Towing Tractor (ATT) and Baggage Towing Tractor (BTT) vehicles from PT Global Sky Aviassi, servicing Lion Air and Batik Air flights, have been in operation since 2017 to 2021. According to the Indonesian Ministry of Transportation Regulation No. PM 91 of 2016, ATT and BTT vehicles fall within a GSE category with a maximum operational lifespan of 10 years. Therefore, these vehicles should have been replaced with newer models.

Additionally, several reports chronicle issues encountered by GSE vehicles during airside operations, indicating that vehicle maintenance is insufficient or that vehicles still undergoing repairs are being forced into operation. These issues hinder the airport personnel's ability to complete their tasks effectively. One specific report details damage to GSE occurring during field operations, underscoring the need for improved vehicle maintenance and supervision.

ASS 'SURAT KRONOLOGIS' GROBAK LEPAS BAN DEPAN KANAN  
SAYA YANG BERTANDA TANGAN DI BAWAH INI

NAMA:SALEH  
ALAMAT:JI. GURU TUA  
PEKERJAAN: SVP AIRSIDE

Dengan ini melaporkan kejadian pada

Tgl:15 des 2023-12-15

Jam:06:45

Lokasi di Apron

Telah mengalami insiden di apron grobak lepas ban depan kanan ketika saya mau tarik gerobak awalnya masi normal tiba ada kendala sama sekali pas saya tarik bebrapa meter laharnya pich dan lanasun ban depan kanan lepas dan saya langsung bergas turundari bet untuk cek ternyata ban depan lepas dan saya sama tim porter untuk pindahkan barang ke grobak lain

Dan saya selaku penanggung jawab di di airside minta maaf kelain kami dan ke depannya sebelum di oprasikan kami akan adakan pengecekan lagi sebelum di gunakan

Demikianlah laporan kronologis ini saya buat dan saya minta maaf sebesar-baarnya dan tidak akan mengulangi lagi

Palu,15 Des 23



MUH.SALEH

SVP :DI AIRSIDE

**Figure 7** Chronological Report of the GSE



## 4.4 Discussion

### 4.4.1. Observational Findings

On December 23, 2023, at Mutiara Sis Al-Jufri Airport, observations revealed that suboptimal supervision by the Apron Movement Control (AMC) personnel led to regulatory violations concerning Ground Support Equipment (GSE). These violations include operating vehicles beyond their recommended service life and inadequate maintenance. Issues observed include malfunctioning air support units, flat tires, damaged driver compartments, and expired licenses. Such problems disrupt airside operations and pose safety risks. Oil leaks, for instance, can damage apron facilities and create hazardous conditions on the apron surface, further exacerbating operational inefficiencies and safety concerns.

### 4.4.2. Interview Findings

Interviews conducted with Bapak Hendra, Bapak Khalid, and Pak Aladin confirmed that managing airside operations is a responsibility of the AMC unit. They emphasized that GSE must adhere to age limits and be well-maintained to ensure optimal operational performance. However, they noted that older vehicles, particularly those operated by PT Global Sky Aviassi for Lion Air and Batik Air flights, are sometimes used due to the high flight frequency and prolonged repair times.

Operators Bapak Kasril and Bapak Rosyid acknowledged operating outdated and poorly maintained GSE, impacting their performance due to operational difficulties and decreased focus. Bapak Rosyid's lack of prior warnings from AMC personnel highlights ongoing supervision deficiencies. The current supervisory system, involving both CCTV monitoring and direct field oversight, is ineffective due to AMC personnel's dual responsibilities, including operating three jet bridges. This issue is compounded by a shortage of qualified personnel and inadequate licensing, which hampers effective airside monitoring.

### 4.4.3. Documentation Findings

Documentation reveals that the shortage of licensed AMC personnel hampers effective GSE supervision. With only three members per shift and several lacking valid competencies or licenses, the unit struggles to meet regulatory requirements stipulated in Law No. 1, Article 222 of 2009, which mandates licensing for all personnel. The absence of a third-party operator for jet bridges forces AMC members to handle three jet bridges simultaneously, further straining their capacity to monitor GSE effectively.

The high number of GSE units at Mutiara Sis Al-Jufri Airport exacerbates the problem, leading to oversight gaps and continued operation of unfit vehicles. Reports indicate that some GSE units, despite being in poor condition or under repair, are still in use, reflecting inadequate maintenance and operational oversight.

## 5. CONCLUSION

Based on the research conducted on the issues outlined in the previous sections, several conclusions have been drawn. First, the oversight by the Apron Movement Control (AMC) unit regarding Baggage Towing Tractor (BTT) and Aircraft Towing Tractor (ATT) vehicles at Mutiara Sis Al-Jufri Airport is inadequate. This inadequacy is primarily due to the insufficient number of licensed personnel and the additional responsibility of operating three jet bridges, which are currently managed by AMC staff. Second, the prevalence of BTT and ATT vehicles exceeding their operational lifespan is attributed to the reliance on CCTV monitoring from the office, while direct inspection of GSE conditions on the apron is necessary for accurate assessment. Third, the continued use of poorly maintained GSE is due to the lengthy vehicle repair processes and the need for additional units to ensure smooth airside operations at Mutiara Sis Al-Jufri Airport. Based on these findings, several recommendations are proposed. First, enhance the quality of AMC personnel through training programs and reactivation of expired licenses. Task allocations should also be adjusted to fit the limited number of personnel and varying skill levels. Once human resource quality improves, it is essential to assign personnel to each shift to directly supervise the airside operations. Second, conduct a thorough inspection of ground service providers and impose strict penalties to ensure that outdated GSE is replaced in accordance with PM 91 of 2016. Providers should also focus on better vehicle maintenance and address issues promptly. Third, the operation of the three jet bridges currently managed by AMC personnel should be transferred to a third-party service provider with greater expertise. If this is not feasible, additional personnel should be recruited to assist with jet bridge operations and airside supervision. Lastly, future research should aim to offer innovative solutions to improve oversight functions and reduce regulatory violations related to GSE age limits on the airside.

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