OPTIMALIZATION OF APRON MOVEMENT CONTROL UNIT PERFORMANCE IN GROUND HANDLING OPERATIONS AT TJILIKRIWUT AIRPORT, PALANGKARAYA

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ABSTRACT
An airport is a facility that provides ground services for aircraft before and after flights. This study analyzes the Apron Movement Control (AMC) at Tjilik Riwut Airport regarding the implementation of Standard Operating Procedures (SOPs) and the supervision of Ground Support Equipment (GSE). Using a qualitative approach, data were collected through interviews, observations, and documentation. The study's findings indicate that AMC performance needs to be evaluated to ensure the effective implementation of SOPs, particularly in coordination, aircraft movement handling, and safety. Insufficient supervision of GSE impacts safety risks, operational efficiency, and maintenance costs. The research was conducted at the Tjilik Riwut Airport apron in Palangka Raya from December 11, 2023, to March 1, 2024.

Keywords: *Optimalization, Performance, Ground Handling, Apron Movement Control*

1. INTRODUCTION

The Apron Movement Control (AMC) unit at Tjilik Riwut Airport in Palangkaraya plays a crucial role in maintaining aviation safety by conducting routine inspections of the runway, taxiway, and apron. They are also responsible for overseeing the operation of Ground Support Equipment (GSE) and ensuring compliance with applicable Standard Operating Procedures (SOPs). AMC's duties include enforcing regulations related to the use of valid airport passes and licenses, as well as ensuring the proper placement of GSE to avoid obstructing the movement of other equipment.

One of the main challenges faced by the AMC is a shortage of personnel, which can impact their daily performance, such as inspection delays due to docking or undocking activities of the passenger boarding bridge (garbarata). Additionally, the inability of AMC personnel to always be on standby at the office can lead to delays in addressing airside issues. However, supervision can be improved through better inspection scheduling and the use of CCTV for remote monitoring, although the current CCTV coverage at the airport is still limited.

With the increase in flights and significant passenger growth at Tjilik Riwut Airport, airside activities are becoming increasingly busy, especially during peak hours. This underscores the importance of strict supervision of ground handling personnel and GSE movements to ensure operational safety and efficiency. PT. Mulio Citra Angkasa, as the airside service provider, holds a significant responsibility in supporting the smooth and safe operation of flights in the apron area.

2. THEORETICAL FOUNDATION

2.1 Optimatization

Optimization, according to the Indonesian Dictionary (Ministry of Education and Culture, Kamus Besar Bahasa Indonesia, 1995), comes from the word "optimal," which means the best or highest. Optimization is an action, process, or methodology to make something (such as a design, system, or decision) more or fully perfect, functional, or more effective (Badudu, Kamus Besar Bahasa Indonesia, 1994). Therefore, the definition of optimization is achieving results with the expectation of being effective and efficient.

Optimization is the process of finding the best solution, not always the highest possible profit if the goal of optimization is to maximize profit, or not always the lowest cost if the goal of optimization is to minimize cost. It can be concluded that optimization is a process in the best, most effective, and efficient way to maximize the results or profits.

2.2 Apron Movement Control (AMC)

2.2.1 Definition

Apron Movement Control (AMC) is a crucial function at an airport, tasked with managing and overseeing all activities and traffic on the apron area. The AMC ensures the smooth operation of ground handling processes by supervising ground service personnel, managing aircraft parking, and coordinating the movement of vehicles and equipment. This includes overseeing activities such as baggage handling, aircraft refueling, and maintenance, while ensuring adherence to Standard Operating Procedures (SOPs) and safety regulations. The AMC also plays a key role in optimizing parking arrangements to maximize efficiency and prevent conflicts.

In addition to operational management, the AMC is responsible for maintaining safety and compliance within the apron area. This involves monitoring traffic movement, conducting safety checks, and ensuring that the apron remains clear of hazards. The AMC coordinates with other airport units, such as air traffic control and security, to ensure seamless operations. By analyzing operational data and providing reports, the AMC helps identify trends and issues, contributing to continuous improvement in airport efficiency and safety.

2.2.2 Function

According to Presidential Regulation Number 21 of 2023, the responsibilities of Apron Movement Control (AMC) staff include: Training ground service personnel for aircraft operations, overseeing and maintaining orderly traffic flow on the apron, managing aircraft parking assignments, ensuring the apron remains clean, verifying that apron facilities are in good condition, ensuring the safety of personnel, equipment, and aircraft movements on the apron, analyzing activities during peak periods or seasons, planning aircraft parking in unusual or emergency situations, coordinating and analyzing operational activities, investigating and reporting incidents or accidents on the apron, making recommendations to prevent recurrence of incidents, and performing visual checks of aircraft stand clearances.

As noted by Amri (2022), the Apron Movement Control (AMC) unit is responsible for overseeing all traffic activities on the apron. This includes managing flight data administration for the airside, assigning aircraft parking, controlling pedestrian traffic, arranging ground handling services, and issuing permits for vehicles operating on the apron.

Hasan and Aditya (2016) state that the Apron Movement Control (AMC) unit is responsible for flight operation services, apron management, and all personnel involved in the airside area. In airside management, the AMC coordinates services, including aircraft parking management, docking and de-docking of jet bridges or aviobridges, Visual Docking Guidance System (VDGS), Aircraft Visual Docking Guidance System (AVDGS), push back and start engine procedures, marshalling, follow-me car services, vehicle supervision on the airside, operational vehicle permit enforcement, Ground Support Equipment (GSE) supervision, apron driving permit (TIM) enforcement, apron cleanliness, and fuel spillage handling. The AMC unit serves as both a service and supervision unit on the airside, with operational service functions including:

a. Aviobridge operational services

b. Marshalling services for aircraft as needed

c. Flight data recording services for Central Information System (CIS) needs

d. Baggage Conveyor Belt (BCB) services

e. Coordinating operational service tasks for various units as required and apron maintenance

2.3 Ground Handling

2.2.1 Definition

According to Minister of Transportation Regulation (PM) Number 33 of 2021, Article 3, airport ground handling activities are support services related to operational aircraft services at airports. Ground handling refers to activities carried out by airlines related to the handling or service of loading and unloading passengers, baggage, cargo, mail, ground support equipment, and the aircraft itself while at the airport, used for both departure and arrival (Suprapto, 2015).

According to Keke and Primadi (2019), "Ground Handling" or "Ground Operations" refers to the knowledge and skills related to handling aircraft on the apron, handling passengers and their baggage in the terminal, and handling cargo and mail in the cargo area. Dharasta and Anton T. (2016) state that ground handling is an airline activity related to the handling or servicing of passengers and their baggage, cargo, mail, ground support equipment, and the aircraft itself while at the airport, for both departure and arrival.

2.2.2 Function

According to Belvadiyanti et al. (2022), ground handling is responsible for the smooth operation of all ground and airside activities at the airport, including the check-in process, ensuring passengers board the aircraft, and their arrival at the destination airport.

2.4 Standart Operating Procedure (SOP)

A Standard Operating Procedure (SOP) is a set of guidelines outlining the steps, processes, and operational standards within an organization. It is designed to ensure that every action, decision, or use of facilities by individuals is carried out effectively, consistently, and in a systematic manner. SOPs are frequently used to demonstrate adherence to regulations or operational practices and to document how essential tasks are performed by individuals or groups within an organization. They act as a reference for various job roles, including educators, administrative staff, production workers, receptionists, office staff, drivers, and managers, providing a standardized approach to their duties.All employees, educators, and education staff need to be trained in drafting and consistently implementing the contents of the SOP. Once created, the SOPs must be executed consistently with discipline and dedication. The commitment of all leaders in educational institutions is essential for the successful implementation of the SOPs.

SOPs have important objectives within an institution, including:

1. Ensuring that all lecturers, education staff, and employees maintain consistency and the highest level of performance within the organization.
2. Clarifying the roles and functions of each position within the organization, avoiding overlapping and ambiguous job situations.
3. Clarifying the workflow, authority, and responsibilities of each related employee.
4. Protecting the organization or employees from risks of malpractice or other administrative errors and preventing unproductive work conflicts.
5. Preventing or avoiding risks of failure or errors, reducing doubts, duplication, and inefficiency.

2.5 Apron

An apron is a designated area at an airport where aircraft are parked, loaded, unloaded, refueled, and serviced. It is typically located adjacent to the terminal and includes various facilities and equipment necessary for ground handling operations. The apron is also known as the ramp or tarmac and is crucial for the efficient and safe turnaround of aircraft between flights. Activities on the apron include aircraft parking, baggage handling, fueling, maintenance, and passenger boarding.

According to SKEP/77/VI/2005, an apron is an airside facility provided as a space for aircraft to conduct activities such as loading and unloading passengers, mail, and cargo, refueling, parking, and aircraft maintenance. Octaviani et al. (2018) describe the apron as the aircraft parking area, also known as the aircraft parking position, where aircraft can load and unload passengers and goods, and receive other services. There are also gates for passengers to board and disembark the aircraft. Lalan et al. (2021) emphasize that the apron is a crucial part of the airport system, serving as a parking area for aircraft, a place for loading and unloading passengers and goods, a space for repairs, and refueling. Additionally, the apron must meet the demand for aircraft gates to facilitate efficient service.

2.6 Equipment Facilities

2.6.1 Baggage Towing Tractor (BTT)

A BTT is a specialized vehicle used in airports to transport baggage and cargo between the terminal and the aircraft. Key features and functions of a Baggage Towing Tractor include:

1. Transporting Baggage: It pulls baggage carts or trailers that carry checked luggage from the terminal to the aircraft or from the aircraft to the baggage claim area.
2. Cargo Movement: It is also used to move cargo and freight to and from the aircraft or cargo handling areas.
3. Design: BTTs are typically designed with a low-profile, high-torque engine to handle heavy loads and navigate the tight spaces of airport aprons and taxiways.
4. Operational Efficiency: The vehicle is equipped with features to ensure smooth and efficient handling of baggage and cargo, including powerful engines, maneuverability, and durability to withstand the demands of airport operations.
5. Safety: BTTs are built with safety features to prevent accidents and ensure the secure transportation of baggage and cargo.

Overall, the Baggage Towing Tractor plays a crucial role in airport ground handling, ensuring timely and efficient movement of luggage and cargo, which is essential for maintaining smooth airport operations.

2.6.2 Ground Power Unit (GPU)

A Ground Power Unit (GPU) is essential airport ground support equipment that supplies electrical power to an aircraft while it is parked on the ground. This allows the aircraft's systems, such as lighting, avionics, and air conditioning, to function without running the engines. GPUs can be either fixed, installed at the airport, or mobile, allowing them to be moved to different aircraft as needed. They provide various power levels, typically measured in volts or hertz, to match the aircraft's requirements. By offering power during ground operations, GPUs help reduce fuel consumption and

engine wear, making them a crucial component in ensuring efficient and safe ground handling.

2.6.3 Push Back Car

A pushback car, also known as a pushback tug or pushback vehicle, is an essential ground support vehicle used at airports to maneuver aircraft away from the gate or parking position. It provides the necessary force to move an aircraft backward from the terminal or gate area without the aircraft's engines running. This vehicle is equipped with a strong, adjustable tow bar that connects to the aircraft's nose gear, allowing the pushback car to safely and efficiently push the aircraft backward.

2.6.4 Baggage Cart

A baggage cart is a ground support vehicle used at airports to transport luggage, cargo, and other items between the terminal and the aircraft. These carts are typically lightweight and designed to be towed by a baggage towing tractor or a similar vehicle. Baggage carts are equipped with multiple compartments or shelves to hold various types of luggage and cargo securely during transit. They play a crucial role in the efficient handling and delivery of passenger baggage and freight, helping to streamline airport operations and ensure that items are delivered to and from the aircraft promptly.

2.6.5 Passanger Boarding Stair

A passenger boarding stair is a mobile platform used at airports to facilitate the boarding and disembarking of passengers from aircraft. It provides a safe and convenient means for passengers to enter and exit the aircraft when a jet bridge is not available. The stair is equipped with steps and railings and is usually adjustable to match the height of the aircraft door. It can be moved to different aircraft positions as needed and is often operated manually or with a motorized system to ensure stability and safety during use.

3. RESEARCH METHOD

The definition of research flow refers to the process encompassing a series of steps or stages that researchers must go through when conducting a study, from problem formulation to reporting results. Research flow can be understood as the sequence of actions taken by researchers to carry out a study. This flow includes the process from problem formulation, data collection, data analysis, to drawing conclusions from the research findings. By following a clear research flow, researchers can systematically organize the research process to achieve the established research objectives.

The research conducted by the author begins with the formulation of the research problem and objectives. Therefore, the steps undertaken by the author should be based on the problem formulation and research objectives. The steps or flow followed in the research to optimize the performance of the Apron Movement Control (AMC) unit in Ground Handling Support operations at Tjilik Riwut Airport Palangka Raya are as follows:

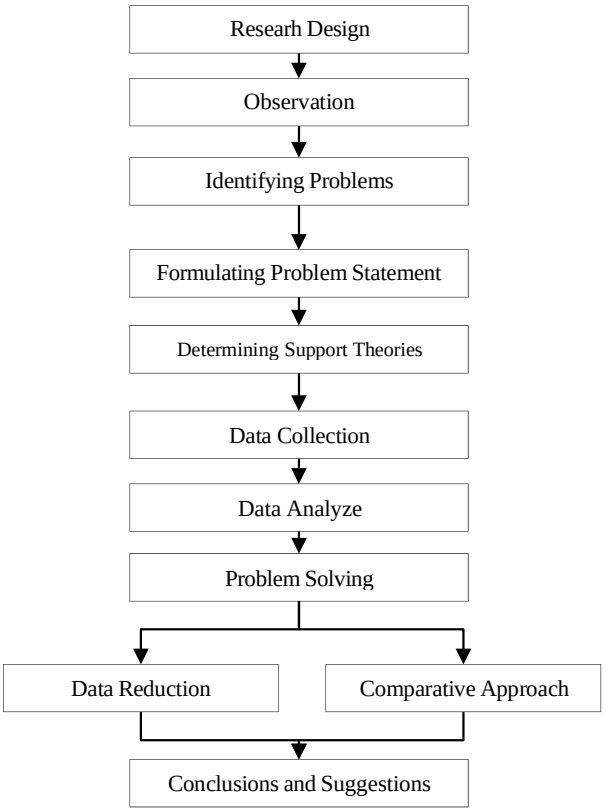

Figure 1. Flowchart Method

4. DISCUSSION

4.1 Observation

Tabel 1. Analyze Observation

No	Dokumentation	Observation Date/Time	Analyze
1		Supervision in the *apron area* 09.15 WIB/ January 21, 2024	Placement of Baggage Towing Tractor (BTT) and carts when not in use is disorganized and untidy.

2		Supervision in the *apron area* 08.30 WIB/ December 4, 2023	Carts left disorganized and parked haphazardly.
3		Supervision of the process of transferring cargo from the aircraft to the cart for delivery to the cargo terminal 13.20 WIB/ January 9, 2024	Carts not secured with chocks in the apron area.
4		Supervision in the *airside area* 08.30 WIB/ January 20, 2024	Passenger boarding stairs placed on the service lane causing interference with other activities.
5		Use *Baggage Towing Tractor* (BTT) 11.25 WIB/ February 11, 2024	Baggage Towing Tractor (BTT) used by two people, whereas it should only be operated by the authorized operator.

4.2 Interview

Based on interviews conducted, personnel from the Apron Movement Control (AMC) have the responsibility of overseeing ground handling staff to ensure that they perform their duties according to the established Standard Operating Procedures (SOPs). The ground handling staff monitored include operators of Ground Support Equipment (GSE). The supervision by AMC is done directly. If a ground handling staff member does not adhere to the SOPs, AMC personnel have the authority to take corrective action against the ground handling staff.

In managing the apron, AMC focuses on the safety, security, orderliness, and smooth operation of aircraft parking and other traffic on the apron. The oversight of apron management is conducted by the Tjilik Riwut Airport Office and the Apron Movement Control (AMC) Unit at Tjilik Riwut Airport. Therefore, all activities related to the movement and operation in the apron area are the responsibility of AMC.

Violations include:

1. Ground handling operators placing Ground Support Equipment (GSE) haphazardly or not in designated areas.
2. Ground handling staff operating the Baggage Towing Tractor (BTT) improperly, with unauthorized personnel also driving the BTT.
3. Frequent incorrect placement of Ground Support Equipment (GSE) on the apron.
4. Push back cars being placed on service roads where they should not obstruct traffic.
5. Failure to use chocks during loading and unloading, which can lead to incidents.

When violations occur, AMC imposes sanctions depending on the severity of the infraction. Minor violations may result in a warning or a written notice. For more serious violations, the involved staff may be prohibited from participating directly in activities. If the violation is considered severe, the staff member may be banned from entering the airport, effectively ending their employment.

Performance evaluation of ground handling staff is based on:

1. Adherence to the applicable SOPs set by AMC.
2. Smooth aircraft servicing without delays caused by ground handling inefficiencies.
3. No issues for passengers in receiving services, avoiding any service-related losses.

In sanctioning, AMC categorizes violations as either severe or minor. Appropriate sanctions are then determined based on the nature of the violation.

4.3 Literatur Study

Table 2. Literatur Study

No	Regulation	Topic	Airport Condition
1	KP 326 of 2019 concerning Technical and Operational Standards for Civil Aviation Safety Regulations - Part 139 Volume I regarding Airports	Responsibilities of AMC Personnel	The performance of AMC personnel is still not optimal, resulting in ground handling operations not running smoothly.
2	SKEP 140 of 1999 on the Requirements and Procedures for Operating Vehicles on the Airside	Operation of GSE	The use of GSE is not properly placed in the designated locations.
3	KM 21 of 2005 on the Implementation of Indonesian National Standard (SNI) 03-7095-2005 Regarding Markings and Signage in Aircraft Movement Areas at Airports as Mandatory Standards	Markings and Signage in Aircraft Movement Areas at the Airport	The markings for the Equipment Staging Area (ESA) have faded and are no longer visible, leading to disorganized operation of Ground Support Equipment (GSE).
4	KP 635 of 2015 on the Standards for Ground Support Equipment (GSE) and Operational Vehicles Operating on the Airside	Ground Support Equipment (GSE) Facilities	The operation of Ground Support Equipment (GSE) should adhere to its standard operating procedures (SOP).

4. RESULT

4.1 Interview

Based on the interviews, the conclusions are as follows:

1. Authority and Duties of Apron Movement Control (AMC) in Supervising Ground Handling Personnel?

   Conclusion: The AMC personnel are tasked with overseeing ground handling staff to ensure they follow established Standard Operating Procedures (SOPs). They have the authority to implement corrective measures if staff members fail to comply with these procedures.

2. Operation of AMC system in supervising ground handling performance?

   Conclusion: The AMC monitors ground handling staff performance primarily through direct observation. This necessary due to the absence of facilities like CCTV that would allow for remote monitoring from within the AMC office

3. What are the reasons for the absence of Equipment Staging Area (ESA) markings in the apron area?

   Conclusion: Tjilik Riwut Airport does not have Equipment Staging Area (ESA) markings in the apron area due to the initial design of the apron being poorly organized.

4. What are the plans for developing apron markings concerning Equipment Staging Area (ESA)?

   Conclusion: There are plans to develop apron markings related to Equipment Staging Area (ESA), but this is still in process with the airport management. This process requires time due to the need to adjust to the current conditions and situation of the apron.

5. What sanctions are imposed if there is a violation by ground handling personnel?

   Conclusion: Before imposing sanctions on ground handling staff who commit violations, the AMC personnel review the specific violation or error committed. Sanctions are adjusted based on the severity of the violation. Minor violations may result in a warning or written notice, while severe violations may lead to the suspension of the Driving License (TIM) and a prohibition on direct involvement in activities.

6. How can awareness among ground handling personnel be increased regarding orderliness in using Ground Support Equipment (GSE)?

   Conclusion: To increase awareness among ground handling personnel, methods such as direct reprimands, unannounced inspections, and ramp safety campaign socializations can be employed.

7. What is your opinion on the number of Apron Movement Control (AMC) members? Is there a need for additional personnel for supervision?

   Conclusion: With the current low traffic volume, six AMC personnel are considered sufficient without the need for additional staff.

8. How can the supervision of Apron Movement Control (AMC) be improved to maximize its effectiveness?

   Conclusion: Since six personnel are adequate, the focus should be on improving facilities, such as adding Closed-Circuit Television (CCTV) to enhance supervision.

9. What is your opinion on adding Closed-Circuit Television (CCTV) to improve supervision?

   Conclusion: Adding Closed-Circuit Television (CCTV) would greatly assist the Apron Movement Control (AMC) personnel in supervision. CCTV is valuable as it can monitor all directions and record any incidents or events on the airside, make-up, and break-down areas, facilitating investigation and maximizing the effectiveness of supervision.

10. Which areas require Closed-Circuit Television (CCTV) installation?

    Conclusion: CCTV installation is needed in the parking stand area, make up area and break down area.

In summary, personnel from Apron Movement Control (AMC) are tasked with supervising ground handling staff and ensuring adherence to SOPs. If violations occur, AMC personnel have the authority to impose sanctions. The absence of Equipment Staging Area (ESA) markings at Tjilik Riwut Airport is due to the initial poor design of the apron. Adding CCTV will significantly aid in supervision by monitoring all directions and recording incidents, thereby improving the effectiveness of supervision by AMC.

4.2 Literatur Study

Table 3. Result Literatur Study

No	Observation	Analyze	Regulation
1		The placement of Baggage Towing Tractors (BTT) and carts when not in use is often untidy due to the lack of awareness among ground handling personnel in organizing Ground Support Equipment (GSE). After use, the GSE is not properly arranged, which can obstruct access roads for other service activities.	According to KP 326 of 2019, Technical and Operational Standards for Civil Aviation Safety Regulations Part 139, Volume I, the duties of Apron Movement Control (AMC) personnel include supervision and guidance of personnel and vehicles in the airport apron area.
2		The situation where carts are not properly arranged and parked carelessly is caused by the absence of an Equipment Staging Area (ESA) and a lack of supervisio	1. KM 21 of 2005 regarding the implementation of Indonesian National Standard (SNI) 03-7095-2005 concerning markings and signs in aircraft movement areas at airports stipulates that the Equipment

		n from Apron Movement Control (AMC). After using Ground Support Equipment (GSE), ground handling personnel do not return the equipment to its original place because they are waiting to service the next aircraft.	Staging Area (ESA) is a white line with a width of 0.10 meters. The ESA functions as an area located outside the aircraft safety area, used to place vehicles and Ground Support Equipment (GSE) when not in use for aircraft. 2. SKEP 140 of 1999 regarding Requirements and Procedures for Vehicle Operations in Airside Areas, Article 28, paragraph b, regulates the prohibition of leaving vehicles unattended, while paragraph d prohibits parking vehicles in movement areas unless the vehicle is serving an aircraft.
3		The carts not being chocked in the apron area is due to a lack of supervisio n from Apron Movement Control (AMC) during the	Article 33 of SKEP 140 of 1999 concerning the requirements and procedures for vehicle operations in the airside area states that vehicles serving an

		loading process from the aircraft to the carts.	aircraft or parked near an aircraft must have brakes applied or other movement restraints installed to prevent the vehicle from moving on its own.
4		A pushback car parked in the service lane causes disruptions to other activities requiring the use of that lane, resulting from insufficient supervisio n, which leads to the vehicle being improperly positioned in the service lane.	KM 21 of 2005, which establishes the Indonesian National Standard (SNI) 03-7095-2005 on markings and signs in the aircraft movement area at airports, states that the Equipment Staging Area (ESA) is an area marked with a white line 0.10 meters wide. The ESA functions as a safe zone, located outside the aircraft safety area, and is used to place vehicles and Ground Support Equipment (GSE) when not in use. □ Article 28, paragraph b, of SKEP 140 of 1999 on the Requirements and Procedures for Operating Vehicles in Airside Areas,

			prohibits leaving vehicles unattended. Paragraph d stipulates that vehicles may only be parked in aircraft movement areas if they are actively providing services to an aircraft.
5		The use of the Baggage Towing Tractor (BTT) by two people, when it should only be operated by the designated operator, occurs due to a lack of supervision and awareness from the operator. This leads to frequent violations of this kind.	KP 635 of 2015 concerning the Standards for Ground Support Equipment (GSE) and Operational Vehicles on the Airside states that the Baggage Towing Tractor (BTT) is equipped with a special frame designed specifically for the operator's position.

6. CONCLUSION

ased on the observations and discussions outlined in the previous chapters, the following conclusions can be drawn regarding the importance of the performance of the Apron Movement Control (AMC) unit in ground handling operations:

1. Performance of the AMC Unit Requires Further Evaluation: Although the AMC unit has made efforts to perform its duties according to the Standard Operating Procedures (SOPs), several areas need improvement to enhance effectiveness in supervision and coordination of aircraft movements.
2. Enhanced Supervision of GSE Operations is Necessary: The oversight by AMC of Ground Support Equipment (GSE) operations needs improvement, particularly in monitoring equipment condition and compliance with SOPs. Inadequate supervision can lead to safety risks and decreased operational efficiency.
3. Non-compliance in GSE Operations Can Lead to Negative Impacts: Improper GSE operations can result in various negative outcomes, including increased accident risk, reduced operational efficiency, and higher maintenance costs. This underscores the need for stricter supervision and ongoing training for ground handling personnel.

Based on the discussion and conclusions provided in the previous chapters, the recommendations that can be offered are as follows:

1. Increase Facilities with CCTV: The addition of CCTV facilities is necessary to monitor apron activities, detect Foreign Object Damage (FOD), oversee the use of Ground Support Equipment (GSE), supervise the performance of ground handling personnel, and provide visual evidence in the event of an incident.
2. Conduct Regular Ramp Safety Campaigns and Training: Regular Ramp Safety Campaigns and training for both personnel and service operators on the apron should be organized to enhance awareness of the importance of adhering to procedures. This will help ensure safety and security, whether under supervision by Apron Movement Control (AMC) or not.
3. Add Equipment Staging Area (ESA) Markings: Implementing Equipment Staging Area (ESA) markings on the apron will improve the organization and orderliness of Ground Support Equipment (GSE) usage.

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