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# Developing Service Quality in Airport Emergency Planning: A Case Study of Mae Fah Luang Chiang Rai International Airport, Thailand

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## Abstract

This qualitative study pursues two objectives: (1) to examine the service quality of the Airport Emergency Plan (AEP) at Mae Fah Luang Chiang Rai International Airport, and (2) to propose guidelines for enhancing that service quality within the same context. A purposive sample of 31 key informants includes airport personnel, external agencies, and emergency planners. The beneficiaries were interviewed using a semi-structured protocol based on the five SERVQUAL dimensions (Tangibles, Reliability, Responsiveness, Assurance, Empathy). Data were analyzed through inductive thematic analysis, and the credibility of the findings was verified via data triangulation across sources. The results show that Reliability is regarded as the most critical dimension, followed sequentially by Assurance, Responsiveness, and Empathy, whereas Tangibles receive the least emphasis. Four overarching themes for enhancing AEP service quality emerged: (1) Staff, (2) Equipment, (3) Process, and (4) Communication. Strengthening reliability and assurance while adhering to CAAT requirements is pivotal to boosting the effectiveness of airport emergency operations. The proposed guidelines can serve as a prototype for other regional airports in Thailand, thereby contributing to the sustainable enhancement of national aviation safety capability.

**Keywords:** SERVPERF, Airport Emergency Plan, Service Quality, CAAT Regulation No. 37, Mae Fah Luang Chiang Rai International Airport

## Introduction

The aviation industry is a cornerstone of global air transportation, enabling the rapid and safe movement of passengers, animals, cargo, and mail worldwide (Boeing, 2020). Beyond mobility, it underpins national

economies by stimulating investment, tourism, and cross-border knowledge, culture, and technology exchange. Prior to the COVID-19 pandemic, global air transport grew 5-6 percent annually, especially in the Asia Pacific region. The 4.5 billion scheduled passengers transported in 2019 are projected to increase to approximately 10.0 billion by 2040. (International Civil Aviation Organization; ICAO, 2019). This expansion helped major airframe manufacturers secure more than 30,000 orders, representing potential revenues above USD 1.8 trillion (Boeing, 2020).

Despite stringent safety standards, aviation accidents persist. Between 1959 and 2020, there were 2,082 recorded incidents, with 54 percent occurring during landing or on airport premises, most notably runway incursions and excursions (Boeing, 2020). Recent examples include the Nok Air accident, 30 July 2022, at Mae Fah Luang Chiang Rai International Airport, where an aircraft veered off the runway, exposing weaknesses in passenger evacuation, vehicle allocation, and inter-agency communication. Next was the Japan Airlines Flight 516, 2 January 2024, a collision with a Japan Coast Guard aircraft at Haneda Airport. However, the cabin announcement system failed, the crew used megaphones and voice commands to evacuate passengers safely (Eng, 2024). In addition, Jeju Air Flight 7C2216, 27 December 2024, a runway excursion and subsequent fire, was suspected of a bird strike despite compliance with air traffic control instructions (Thairath online, 2024). Moreover, the Delta Air Lines Flight DL 4819, 18 February 2025, which overturned during landing at Toronto Pearson amid heavy snow and high winds (Rios & Skores, 2025).

Such events jeopardize passenger safety, disrupt airport operations, trigger flight delays or cancellations, impose costly infrastructure repairs and compensation, and damage the reputations of airports and airlines, especially when emergency response is poorly coordinated. Although numerous studies address airports and airlines, in-depth academic research on airport emergency plans remains limited, particularly at regional airports like Mae Fah Luang–Chiang Rai International Airport. Given this airport's economic significance to northern Thailand, the present study "Developing Service Quality in Airport Emergency Planning: A Case Study of Mae Fah Luang Chiang Rai International Airport, Thailand" is both necessary and valuable. It aims to propose measures for modernizing and enhancing the airport's emergency plan in line with the Civil Aviation Authority of Thailand (CAAT) requirements and International Civil Aviation Organization (ICAO) standards, thereby elevating safety and user confidence and offering a model for other regional airports.

## Research Objective

In light of the aviation industry's pivotal role in driving the national economy, coupled with the paramount need to safeguard passengers, the effective implementation of airport emergency plans is indispensable, particularly for regional airports that face resource, personnel, and managerial constraints. A failure to respond

to emergencies could have far-reaching consequences. Accordingly, this study has two primary objectives:

1. To examine the service quality of the airport emergency plan in the context of Mae Fah Luang Chiang Rai International Airport.

2. To propose the key factors for development strategies for enhancing the service quality of the airport emergency plan at Mae Fah Luang Chiang Rai International Airport.

## Research Questions

1. What are the characteristics of the service quality provided by the airport emergency plan at Mae Fah Luang Chiang Rai International Airport?

2. Which are the key factors for development strategies for the airport emergency plan at Mae Fah Luang Chiang Rai International Airport that will align with Civil Aviation Authority of Thailand (CAAT) requirements and facilitate effective implementation?

## Literature Review

### 1. Concepts and Theories Concerning Service Quality

Meaning of Service Quality

Parasuraman et al. (1991) state that service quality is an externally perceived attribute, judged from the consumer's own service experience. To clarify this construct, Grönroos (2007) proposes that users evaluate two dimensions of service quality: (1) technical quality, it what is actually delivered, and (2) functional quality, which is how the service is delivered. Both dimensions shape a provider's image. Lovelock and Wirtz (2006) add that "quality" and "satisfaction" are often used interchangeably, with perceived service quality forming just one component of customer satisfaction and reflecting personal and situational factors. Sahney et al. (2004) note that the term quality derives from the Latin qualis ("of what kind") because no single definition is universally accepted; individuals interpret the concept differently.

Thai scholars echo these views. Chongkolphuet (2020) defines service quality as the efficient delivery of services that guide customer choice, while Ngammak and Na Talang (2020) describe it as the organization's ability to meet service-business needs; superior service quality distinguishes firms from competitors. In sum, service quality is the organization's capacity to satisfy customer needs in the required form, time, and place; customer satisfaction arises only when these conditions are met.

Criteria for Defining Service Quality

Parasuraman et al. (1988) developed SERVQUAL, a widely adopted scale for measuring service quality. It groups 22 items into five main dimensions:

Tangibles are the observable environment and physical attributes that support service delivery (personnel, communication equipment, facilities, ambience, etc.). Tangible presentation builds confidence and satisfaction. There were (1) Environment: a suitably arranged, hygienic, well-lit space that conveys safety and credibility. (2) Equipment: modern, reliable devices (phones, radios, signage, markings, announcements) that enhance communication reach. (3) Service apparatus: enough units to meet demand, and (4) Service personnel: professional appearance and deportment influence customers' perception of quality.

Reliability delivers promised service accurately and on time, creating trust through error-free, punctual performance. There were (1) Staff ability to honor promises, (2) Data security and appropriate use of customer information, (3) Maintenance of equipment to ensure readiness, and (4) Sufficient staffing levels.

Responsiveness is the willingness and readiness to meet customer requests without refusal, providing immediate assistance whenever questions, requests, or urgent situations arise. This aligns with Maslow's (1943) hierarchy of needs (physiological, safety, love/belonging, esteem, self-actualisation). There were (1) Rapid service systems, (2) Staff availability for consultation, (3) Speed of staff performance, and (4) Immediate service upon demand.

Assurance is the knowledge, courtesy, and politeness that instill confidence and trust. There were (1) Staff expertise in providing information, (2) Creation of safety and confidence, (3) Staff politeness and manners, and Behaviors that reinforce trust.

Empathy is individualized, compassionate attention tailored to each customer's unique needs ("putting oneself in another's place"). There were (1) Personalized care and attention and (2) Adequate service time.

Individualized

However, Zeithaml et al. (1990) later streamlined the original ten dimensions into the five-factor RATER model. The five factors are Reliability, Assurance, Tangibility, Empathy, and Responsiveness to reduce overlap and simplify assessment.

Concepts and Theories Concerning the Measurement of Perceived Service Quality

Several theorists and researchers have proposed diverse approaches for assessing service quality. The most traditional and widely used method, however, is the disconfirmation model, which gauges the gap between performance and expectations (Robledo, 2001; Cronin & Taylor, 1992). Cronin and Taylor (1992), after examining the SERVQUAL scale, observed that it measures customers' expectations of service quality. Because the SERVQUAL expectation items are answered after the service experience, this step can introduce bias. They therefore argued that it is unnecessary to measure expectations; evaluating only customers' perceptions of their actual experience is both sufficient and appropriate.

Beyond SERVQUAL, the Airports Council International (ACI) developed an instrument specifically suited to airport services: the Airport Service Quality (ASQ) scale. ASQ is used worldwide to analyses passenger opinions, benchmark airport performance, and identify success factors (Airport Council International; ACI, 2017). It covers seven service areas: (1) Access to and from the airport, (2) Check-in, (3) Passport and Personal-ID Control, (4) Security, (5) Finding Your Way, (6) Airport Facilities, and (7) Airport Environment.

Although ASQ effectively measures passenger satisfaction, it has notable limitations.

It focuses on routine experiences (e.g., check-in, cleanliness, comfort) and does not evaluate emergency-management performance. Moreover, it lacks dimensions for assessing emergency readiness (e.g., evacuation, disaster response, handling unexpected events). In addition, it relies on passenger surveys, which may not reflect the airport's actual emergency-management capability. Because of these constraints, ASQ is ill-suited for research aimed at improving the service quality of airport emergency plans, which require a comprehensive view of readiness and effectiveness in crises.

Returning to SERVQUAL, critics note that it is grounded more in the satisfaction paradigm than in an attitude model; Cronin and Taylor (1992) contend that perceived service quality is better conceptualized as an attitude. Consequently, they introduced a new assessment method, SERVPERF, which measures only customers' perceptions of performance, excluding expectations. Likewise, Teas (1993) questioned SERVQUAL's validity across service industries, citing three main issues. There is an unclear definition of expectation. The use of expectation scores in quality assessment, and the theoretical doubts about the distinction between perception and expectation. Therefore, the Evaluated Performance Model was proposed, which, like SERVPERF, assesses service quality solely from perceived performance, omitting expectations. Extensive quantitative and qualitative studies show that SERVQUAL is widely used to measure customers' expectations and perceptions across five dimensions. There are Tangibles, Reliability, Responsiveness, Assurance, and Empathy. Satisfaction occurs when perception equals expectation; delight occurs when perception exceeds expectation; dissatisfaction arises when perception falls below expectation.

Recognizing SERVQUAL's shortcomings, many researchers adopt SERVPERF, which excludes expectation items. SERVPERF's fewer dimensions make it easier to capture service-quality contexts than SERVQUAL. Given the uncertainty and crisis-oriented nature of airport emergency plans, SERVPERF is more appropriate for evaluating service quality in this context, particularly for the case of Mae Fah Luang Chiang Rai International Airport, Thailand. By emphasizing passengers' subjective perceptions, SERVPERF excels at assessing experiences in stressful, unforeseen situations, an advantage over technically oriented tools such as those of ICAO or ACI, which focus on compliance during normal operations and may not fully reveal real-world operational issues.

## Concepts and Theories Concerning Airport Emergency Plans

### Definition of an Emergency

An emergency is any unforeseen event that threatens human safety, can escalate rapidly, and inflicts significant harm on life, property, the environment, or the continuity of operations. In Thailand, the Office of the State Enterprise Policy Committee (Ministry of Finance) defines an emergency as a circumstance that endangers national security, disrupts public order, or involves natural disasters affecting the public domain (Office of the Permanent Secretary, Ministry of Finance, 2024).

### The Aviation Context

Aviation is exceptionally vulnerable to both direct and indirect disruptions—whether aircraft-, airport-, or air-navigation-related, or triggered by natural disasters, public-health crises, or unlawful interference. Because airports also underpin tourism and trade, disturbances generate cascading financial, environmental, social, and logistical repercussions. During regional crises, airports become strategic assets that supply resources and sustain critical functions throughout response and recovery; paradoxically, their specialised infrastructure often requires external assistance to restore operations (ICAO, 2022b).

For the historical evolution of airport Emergency Planning (AEP), Annex 14, Volume I of the Convention on International Civil Aviation first referenced rescue and fire-fighting services in 1958. In 1979, explicit AEP requirements were added, obliging airports to devise procedures for abnormal events that could cause catastrophic loss of life or property, emphasising response rather than preventive security (ICAO, 2022a).

A pivotal case underscoring the need for robust AEPs is Delta Air Lines Flight DL191 (2 August 1985). A severe microburst on approach to Dallas/Fort Worth International Airport caused the aircraft to crash, killing 136 occupants and one motorist. The National Transportation Safety Board (NTSB) attributed the accident to weather, deficient low-altitude wind-shear training, and the absence of onboard microburst detection; it also criticized delayed notification to off-airport responders, which could have jeopardized medical aid under different circumstances (National Transportation Safety Board; NTSB, 1986). In the aftermath, NTSB Safety Recommendation A-86-090 called for improved alert procedures, joint reviews of airport emergency plans, and full-scale exercises every 24 months. The Federal Aviation Administration (FAA) subsequently incorporated these elements into Advisory Circular 150/5200-31, while 14 CFR Part 139 began requiring U.S. airports to maintain, review annually, and exercise their AEPs at least every 36 months (NTSB, 1986).

### Development of Airport Emergency Plans

In June 1999, the Federal Aviation Administration (FAA) revised Advisory Circular AC 150/5200-31A, adopting the Comprehensive Emergency Management (CEM) framework of the Federal Emergency Management Agency

(FEMA). CEM divides emergency management into four phases: (1) mitigation, (2) preparedness, (3) response, and (4) recovery. The FAA did not mandate that certificated airports implement every phase; instead, airports were told to concentrate on response and initial recovery, while detailed mitigation or full recovery plans could be handled separately (Federal Aviation Administration; FAA, 1999). The CEM framework stresses systematic coordination among government, private-sector, and community stakeholders, extending beyond response to cover advanced prevention and post-event restoration (Ha & Oh, 2014). Designed for flexibility, CEM can be applied to natural disasters, terrorism, or human-caused incidents, with the overarching goal of protecting life, property, and societal security (Lu & Han, 2018). The 11 September 2001 terrorist attacks profoundly affected airports, first responders, and the entire U.S. emergency management system. In 2004, the National Response Plan (NRP) was introduced, changing how responders plan, communicate, and coordinate by incorporating both the National Incident Management System (NIMS) and the Incident Command System (ICS) tools that direct, control, and synchronize multi-agency resources to safeguard life, property, and the environment during emergencies.

In 2008, the NRP was superseded by the National Response Framework (NRF). The FAA then updated its airport guidance again in 2009, merging NRF and NIMS requirements. Under the new advisory, every Airport Emergency Plan (AEP) must embed NIMS within its command-and-control structure and utilize an Emergency Operations Center (EOC) to coordinate all agencies involved in an incident response.

**Airport Emergency Plans in Thailand**

In Thailand, any airport open to the public must operate in full compliance with laws, regulations, and directives issued by the national regulator. Civil Aviation Board Regulation (CAB) No. 82 on Aerodrome Safety Management Systems stipulates that a public aerodrome operator may operate only after establishing an Aerodrome Safety Management System that includes the following elements (Civil Aviation Board of Thailand, 2008). There were Safety policy and objectives, (1) Organizational structure and responsibilities, Documentation as a system that keeps all safety management information current and accessible, (2) Safety hazard identification and risk management which includes hazard identification, safety-risk management, and internal safety investigations, (3) Safety assurance which includes monitoring or measuring safety performance, management of change, and continuous system improvement, (4) Safety promotion which is safety training and safety communication, and (5) An emergency plan which is demonstrating that the aerodrome can manage emergencies systematically and effectively, including resuming normal operations, and clearly identifies the agencies and responsible persons who have the authority to act during an emergency

Civil Aviation Authority of Thailand (CAAT) Requirement No. 37 on Aerodrome Standards further mandates that every aerodrome prepare an Emergency Plan consistent with its aircraft operations, activities, and environment.

The plan shall coordinate all actions for emergencies occurring on or in the vicinity of the aerodrome and cover, at minimum, procedures for (Civil Aviation Authority of Thailand, 2022). There were (1) Aircraft-related emergencies concern, (2) Acts of unlawful interference, including bomb threats and hijacking, (3) Dangerous-goods incidents, (4) Structural fires, (5) Natural disasters, (6) Public health emergencies that increase the risk of cross-border disease spread or pose a severe threat to airport personnel. Furthermore, the public aerodrome operators must also establish an exercise schedule and evaluation procedures to keep the plan effective: (1) Full-scale emergency exercise, at least once every two years, ensuring overall readiness for all types of emergencies. (2) Partial emergency exercise, in years without a full-scale drill, to address deficiencies found in the previous full-scale exercise and to verify the readiness of specific plan components (e.g., communications). (3) Table-top exercise, every six months, except when a full-scale exercise is held, to rehearse coordination in a simulated scenario

After any exercise or an actual emergency, the aerodrome must review the plan, correct deficiencies, and retain the evaluation records. These regulations confirm that an Emergency Plan is an integral part of an aerodrome safety-management system, intended to prepare the airport for incidents on or near the airfield. The plan's chief objectives are to limit emergency impacts, especially by saving lives and maintaining flight operations. Therefore, it must spell out coordination processes for all agencies involved, including external organisations that may assist in the response. To keep the plan practical and effective, airport operators must review, update, and improve it continuously and in collaboration with stakeholders.

This research assesses service quality in airport emergency plans using the SERVPERF framework (Cronin & Taylor, 1992), which measures passengers' perceptions of service performance without considering expectations. SERVPERF is appropriate for specialized services such as emergency plans that passengers rarely experience under normal conditions. It evaluates five dimensions: (1) Tangibles, (2) Reliability, (3) Responsiveness, (4) Assurance, and (5) Empathy.

Concurrently, CAAT Requirement No. 37 provides the regulatory content for an airport emergency plan, while the study integrates the Comprehensive Emergency Management (CEM) Framework, whose primary focus is on Response and Recovery, aligns closely with SERVPERF's Responsiveness and Assurance dimensions. Thus, SERVPERF offers a theoretically sound and context-appropriate tool for measuring service quality in the emergency-plan setting, specifically at Mae Fah Luang Chiang Rai International Airport.

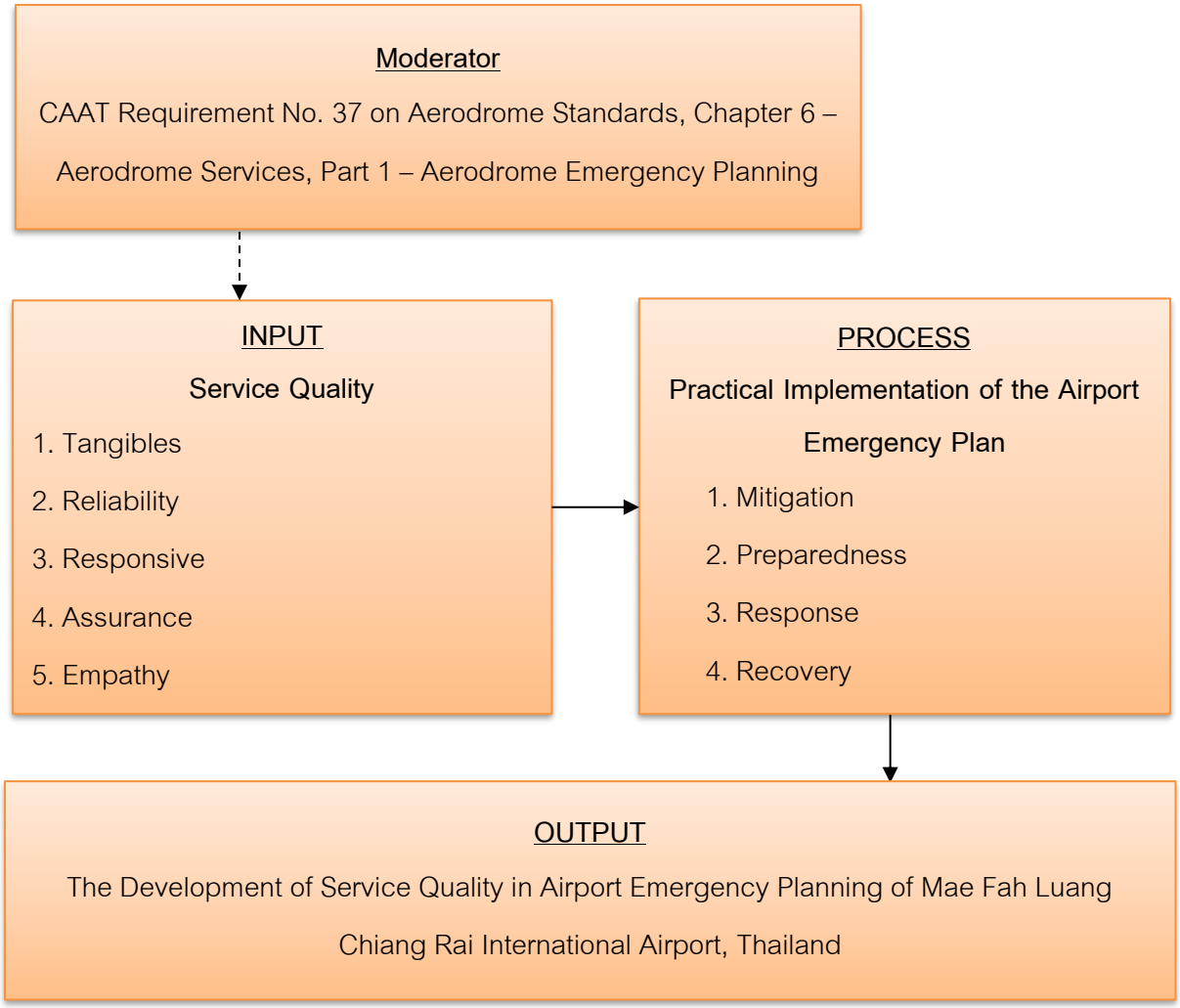


**Figure 1** Research conceptual framework

**Research Methodology and Data Collection Scope**

This study employed a qualitative, single-case design to explore service quality within the Airport Emergency Plan (AEP) of Mae Fah Luang Chiang Rai International Airport. Data were gathered through semi-structured, open-ended interviews, which allowed participants to articulate detailed experiences and perceptions in their own words. For the Conceptual Frame, Input–Process–Output (IPO); the investigation was structured around the Input–Process–Output (IPO) model. The input comprised the five SERVQUAL dimensions. There were Tangibles, Reliability, Responsiveness, Assurance, and Empathy, as originally articulated by Parasuraman et al. (1988). The process corresponded to the four phases of emergency management. There were mitigation, preparedness, response, and recovery, while the output was a set of evidence-based Guidelines for improving the airport emergency plan to comply with CAAT Requirement No. 37 (Civil Aviation Authority of Thailand; CAAT, 2022). For Participant Selection, a purposive sampling strategy targeted individuals directly involved in AEP

implementation. There were namely, members of the airport's Emergency Committee and representatives of supporting agencies. Thirty-one stakeholders met the inclusion criteria and were invited; all consented to participate. Data saturation, the point at which no novel themes emerged was achieved after twenty-one interviews (67.74 % of the committee), consistent with Guest et al.'s (2006) empirical benchmark for qualitative saturation in homogeneous groups. For Data Collection, interviews were guided by a carefully piloted protocol that aligned each question to SERVQUAL dimensions and emergency-management phases. Sessions averaged 60 minutes, were audio-recorded with permission, and transcribed verbatim for analysis. Field notes captured non-verbal cues and contextual details immediately after each interview. For Data Analysis, verbatim transcripts underwent thematic analysis following Braun and Clarke's (2006) six-step procedure: (1) familiarization, (2) initial coding, (3) theme searching, (4) theme review, (5) theme definition and naming, and (6) report production. An inductive approach enabled themes to emerge organically from the data, while constant comparison across transcripts ensured analytical rigour. Credibility was further enhanced through investigator triangulation. The two researchers independently coded a subset of transcripts and reconciled discrepancies through discussion. Moreover, the Trustworthiness, to bolster trustworthiness, the study applied (a) source triangulation by including diverse internal and external stakeholders; (b) member checking, wherein summary findings were returned to several interviewees for verification; and (c) an audit trail documenting all methodological decisions. These procedures align with qualitative best practices and reinforce the dependability and confirmability of the results.

## Research Findings

The study population comprised 31 members of the Mae Fah Luang Chiang Rai International Airport Emergency Committee and its supporting agencies. Twenty-one participants (67.74 %) completed in-depth, semi-structured interviews. After the twenty-first interview, no new information or codes emerged, indicating data saturation. This interview-to-theme convergence mirrors the empirical guidance of Guest et al. (2006), who found that more than 70 % of key themes in a homogenous sample arose within the first six interviews and 92 % by the twelfth.

### 1. The service quality of the airport emergency plan in the context of Mae Fah Luang Chiang Rai International Airport.

Participants represented all organizational tiers. There were executives, section heads, and front-line operational staff. The study provides a 360-degree view of the Airport Emergency Plan (AEP). When asked which SERVPERF dimensions most urgently required enhancement, the frequency of citations was as follows. For Reliability is 18 (85.7%), Assurance is 18 (85.7 %), Responsiveness is 16 (76.2 %), Empathy is 16 (76.2 %), and Tangibles is 12 (57.1 %). The data indicate that stakeholders give the highest priority to Reliability and Assurance, that is, consistent

performance and confidence-building measures. Responsiveness and Empathy follow closely, reflecting the need for timely assistance and personalized support during emergencies. Tangibles are the physical and visual aspects of the plan that receive comparatively less emphasis, suggesting that material attributes alone are insufficient to assure stakeholders of AEP effectiveness.

These findings reinforce the centrality of dependable execution and trustworthy communication in airport emergency contexts, while also highlighting the importance of rapid response and stakeholder-centred care. A total of 21 interviewees confirmed that they were aware of the airport's establishment of a mobile incident-command post at the scene. Their remarks about how the airport emergency plan is distributed to each agency can be summarized as follows:

**1) Tangibles Dimension**

Interview data indicate that Mae Fah Luang Chiang Rai International Airport has met basic regulatory requirements for physical documentation by distributing a bound, hard-copy Airport Emergency Plan (AEP) to every Emergency Committee member (Key Informant 3). Nevertheless, participants recommended augmenting hard copies with a digital version, such as a QR-code download, to improve off-site accessibility (Key Informant 9). Others judged the existing tangible resources "sufficient," yet urged that periodic, function-specific reviews be embedded in daily routines: field-response units should drill realistic incident scenarios more frequently, whereas support units could focus on planning and resource mobilization checks (Key Informant 2).

**2) Reliability Dimension**

Respondents consistently emphasized that the AEP performs reliably under routine conditions, yet they cautioned that real incidents may demand rapid, situation-specific judgment beyond written procedures (Key Informant 12). Veteran staff confirmed that standard operating procedures are clear and well internalized, crediting long-term cross-agency drills dating back to 2013 with sharpening operational competence (Key Informant 11). Nonetheless, some warned that aircraft-rescue resources remain thin for large-aircraft scenarios and advocated contingency arrangements borrowing or leasing specialized equipment from nearby aerodromes, military units, or provincial agencies to reinforce system reliability (Key Informant 16).

**3) Responsive Dimension**

Interviewees portrayed a multi-layered response network. Under provincial law, the Department of Disaster Prevention and Mitigation (DDPM) serves as the on-call coordinator, mobilizing extra personnel, machinery, and equipment whenever the airport declares an emergency (Key Informant 19). Internally, the airport can handle Code C aircraft events autonomously, but acknowledges that mass-casualty incidents involving larger Code E aircraft would outstrip its fire-rescue capacity; hence, formal mutual-aid agreements with external agencies have been signed to ensure surge support (Key Informant 12).

4) Assurance Dimension

Stakeholders reported that day-to-day operations comply with established aviation-safety standards, underpinned by continuous inter-agency monitoring and real-time alerting (Key Informant 7). The Standards Division conducts evidence gathering and submits occurrence reports in line with CAAT Requirement No. 22, while serious incidents trigger an independent investigation by the competent authority (Key Informant 20).

5) Empathy Dimension

Participants valued the airport's post-exercise debriefing culture, where internal and external experts submit evaluation forms and the Emergency Committee collectively identifies improvement priorities (Key Informant 11). Fire-rescue personnel receive cross-training for diverse environments, while mutual-aid pacts secure specialist capabilities such as water rescue when in-house resources are limited (Key Informant 18). Moreover, facilitators actively solicit granular feedback from every agency to capture overlooked operational hurdles and refine the plan (Key Informant 9).

**2. The proposed key factors for development strategies for enhancing the service quality of the airport emergency plan at Mae Fah Luang Chiang Rai International Airport.**

The researcher employed thematic analysis based on the framework of Braun and Clarke (2006), which includes the following six steps. The data was gathered through in-depth interviews with 12 individuals involved in the airport emergency plan, including internal and external agencies as well as users of the emergency services at Mae Fah Luang Chiang Rai International Airport. The synthesized results are in four core themes. The analysis identified four key themes that reflect "gaps" between the current conditions and the CAAT Requirement No. 37, while also aligning with the five SERVPERF dimensions. There were (1) Staff, this is the most vulnerable aspect, especially in regional airports where staffing is limited. Therefore, reinforcing backup personnel and enhancing specialized skills is necessary to improve Reliability and Assurance in the delivery of emergency services. (2) Equipment, the availability and adequacy of equipment, directly affect the Tangibles dimension. Cooperation with airlines to reduce costs and manage radio frequencies helps optimize resources in line with the Resource-Based View (RBV) theory. (3) Process, emphasis should be placed on Realism and Integration to enhance the airport's Responsiveness. The process should align with the Comprehensive Emergency Management (CEM) framework, which includes Mitigation, Preparedness, Response, and Recovery. This approach aims to build the airport's Dynamic Capabilities. And (4) Communication, effective communication influences both Empathy and Assurance. It also plays a role in mitigating image-related impacts, according to the Balanced Scorecard under the customer perspective. Therefore, having a Joint Information Center and clear flowcharts is essential for coordinating across all stakeholders.

## Research Discussion and Conclusion

### 1. Discussion

This study applied SERVPERF to examine perceived service quality in the Airport Emergency Plan (AEP) of Mae Fah Luang Chiang Rai International Airport. Key informants individuals directly responsible for emergency management placed the greatest weight on Reliability, followed by Assurance, Responsiveness, and Empathy; Tangibles attracted the least attention. The ranking suggests that, in a crisis context, stakeholders value consistent execution, clear authority, and rapid, human-centred response over physical artefacts such as manuals or equipment display.

The pattern diverges from findings in routine-service settings. For example, airport users in Udon Thani prioritised safety, tangibles, and customer understanding, whereas reliability and staff credibility were marginal (Chanawutthikulkiti et al., 2018). Likewise, passengers choosing a low-cost carrier ranked tangibles first and assurance last (Tayanuwat, 2020). This contrast is explicable: studies of day-to-day passenger experience typically capture visible cues such as cleanliness, comfort, and technological modernity, whereas the present research interrogates emergency readiness, a domain in which procedural rigour and personnel competence dominate evaluative criteria.

From a theoretical standpoint, the emphasis on Reliability and Assurance affirms the tenets of SERVPERF and the Comprehensive Emergency Management (CEM) framework, both of which foreground accurate execution, preparedness, and coordinated response (Cronin & Taylor, 1992; Ha & Oh, 2014). Conversely, the low salience of Tangibles exposes a potential communication gap. Although drills are conducted, some external agencies still appear unsure of their precise roles. An issue that undermines the CEM principle of shared situational awareness. Absent clear visual and documentary signals of readiness, stakeholders may question the airport's safety culture despite robust internal capability.

### 2. Conclusion

#### Service Quality of Airport Emergency Plans through the SERVPERF

The gulf between high scores for Reliability and low scores for Tangibles indicates that enhancing AEP quality cannot rely solely on strengthening procedures and training. Airports must also design physical and informational environments that make operational readiness visible and intelligible to all stakeholders. Investment in user-centric documentation, real-time digital access (e.g., QR-code plans), and scenario-specific briefing materials would help translate internal competence into external confidence.

Accordingly, airport operators should pursue a dual strategy: (1) Maintain and refine system reliability through regular multi-agency drills, rigorous after-action reviews, and contingency agreements that guarantee surge capacity

for low-probability, high-impact events. (2) Elevate tangibility by curating physical and digital artefacts, clear signage, interoperable communication tools, and context-matched training aids that signal professionalism and preparedness to every participant in the emergency network.

Adopting this balanced approach will not only narrow the perceptual gap identified in the present study but also reinforce public trust, align practice with CEM expectations, and ultimately strengthen Thailand's regional aviation-safety posture.

**Guidelines for Enhancing Airport Emergency Service Plans**

Beyond the findings on service quality based on the five SERVPERF dimensions, this study also discovered practical guidelines for improving the quality of airport emergency service delivery, using the case of Mae Fah Luang Chiang Rai International Airport. The researcher has identified four key areas of development: (1) Staff, (2) Equipment, (3) Process, and (4) Communication, detailed as follows: **For 1. Staff**, the airport should: (1) Reserve Staffing and Human Resource Planning: A contingency manpower plan should be prepared for each role related to emergency response. This includes identifying "multi-role staff" who can be reassigned depending on the emergency context, particularly if external agencies are unable to support according to the emergency plan, such as during simultaneous incidents or when personnel are deployed for other operations. (2) Role Awareness and Clarity: Regular inter-agency meetings should be held to explain the responsibilities of each agency, especially with external stakeholders such as rescue units, fire departments, and medical networks. These partners may not fully understand the sequence of operations under the airport emergency plan. The International Civil Aviation Organization (ICAO) recommends conducting inter-agency workshops at least once per year to foster mutual understanding. (3) Specialized Training: Airports or airline-related agencies should consider targeted training, such as the proper use of personal protective equipment (PPE) or decision-making in high-pressure, multi-variable scenarios. This enhances staff capability to effectively respond to real crises. (4) Involvement of High-Level Authorities in Drills: Including provincial governors or senior executives in emergency drills not only increases their operational awareness but also demonstrates the importance placed on emergency preparedness. This aligns with the FEMA (Federal Emergency Management Agency) approach in the U.S., which promotes participation of top-level officials in drills under the National Incident Management System (NIMS). **For 2. Equipment**, the airport should: (1) Collaboration with Airlines for Equipment Use: To enhance drill realism, collaboration should be sought with airlines to use actual aircraft or life-like equipment (e.g., wheelchairs, mock luggage). This mirrors Incheon Airport's practice of using retired aircraft in evacuation simulations during fire scenarios. (2) Radio Frequency Management: Clear radio frequency allocation between departments is essential, with designated primary and backup communication points to prevent interference. This ensures controlled

and efficient access to communication channels. For 3. Process, the airport should: (1) Comprehensive and Realistic Drills: Drills should be conducted in underutilized areas (e.g., Relative Area, Matching Area) and include unexpected scenarios such as alarm system failures or equipment shortages to test real-time decision-making capabilities. (2) Integration with Related Plans: The emergency plan should be systematically linked with the Business Continuity Plan (BCP) and Emergency Operation Plan (EOP) to avoid long-term disruptions, for example, in rerouting passengers or setting up temporary facilities. (3) Review of Roles and Procedures: Annual or post-drill reviews should assess whether the responsibilities of each unit are still appropriate and identify areas needing improvement. Real incident feedback should be collected through a formal feedback loop to continuously refine the emergency plan. (4) Functional Sub-Drills: In addition to full-scale exercises, functional drills should be conducted by tasks, such as aircraft or fire rescue, patient transport, or communication center setup. These can be held monthly or quarterly to refresh operational skills. (5) Vehicle Screening System: Airports should implement a systemic approach to control vehicle access, authorizing only specific individuals or agencies based on designated objectives. This is similar to Los Angeles Airport (LAX), which uses electronic permit cards linked to a participant database during drills. For 4. Communication, the airport should: (1) Clear Communication Mapping: Maps should distinctly indicate ON-Airport vs. OFF-Airport zones (e.g., coordinate code B15 for on-site, BB15 for off-site). Airports may also consider color-coded alphanumeric grid maps for easy reference, ensuring all involved stakeholders have a unified understanding and awareness. (2) Establishment of a Public Information Center: In emergencies, a central Passenger Info Center should provide information to passengers' relatives and the media, supported by psychological assistance and interpreters. This minimizes anxiety and ensures accurate, rapid dissemination of information. (3) Use of Media to Build Awareness: Creating drill demonstration videos and allowing media access to capture news footage can enhance the airport's safety image and boost its credibility. (4) Review of Inter-Agency Contact Channels: Contact details for all relevant agencies must be reviewed regularly to ensure effective coordination in emergencies. This includes backup options such as emergency numbers, alternative radio frequencies, or specialized apps like ALERTUS, used in many U.S. airports.

These proposed approaches aim to systematically elevate the airport's emergency preparedness, improve coordination accuracy, minimize losses, and instill confidence in both service users and partner organizations. In essence, these efforts not only enhance real-time response efficiency and reduce potential damage but also contribute to raising safety standards and public confidence in air transport infrastructure. This is especially crucial in an era where public expectations of safety are continually rising. A high-quality and functional emergency plan is now

considered a fundamental competitive advantage for Thailand's aviation industry on the global stage, supporting its long-term growth in economic, tourism, and national security dimensions.

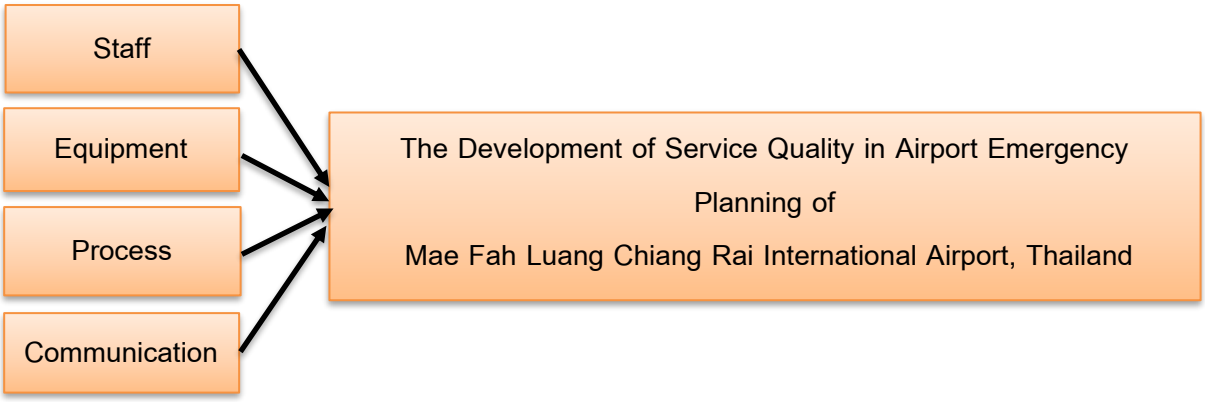


**Figure 2** The conceptual model of systematically elevating the airport's emergency preparedness, improving coordination accuracy, minimizing losses, and instilling confidence in both service users and partner organizations

**Recommendations for Future Research**

1. Future studies should conduct in-depth research on emergency personnel allocation at airports, as the interview data revealed consistent views regarding the "readiness and adequacy of airport staff during emergencies." Specifically, 10 key informants confirmed the readiness of airport personnel. However, there is currently no quantitative data or simulation model to support management in mass casualty incidents (MCI) or to evaluate the appropriate number of personnel required for each type of emergency, such as acts of terrorism, fires, or hazardous material incidents. This suggests the need for a Contingency Staffing Plan tailored to specific scenarios.

2. A comparative study of emergency service quality across other regional airports, such as Chiang Mai, Hat Yai, or Khon Kaen airports, should be conducted. This would provide insights into differences in resources, organizational structure, operational procedures, and emergency response readiness. Such comparisons would generate in-depth data that can inform national-level emergency plan development across airports more comprehensively.

3. Relevant authorities may adopt the researcher's policy-level recommendations to improve or establish related policy measures. These can be structured into three levels: (1) Airport Policy Level: Airports should promote the development of digital emergency plans (E-plans) that are accessible in real time via QR codes or cloud-based storage. Additionally, backup communication plans should be prepared in case the primary network fails. The emphasis should be on ensuring inter-agency communication redundancy to maintain continuity during crisis operations. (2) Operational Level (Internal/External Agencies): A shared dashboard system should be created to allow

external agencies to report and track emergency response status in real time. This should be paired with checklists for assessing and confirming the readiness of supporting agencies before conducting drills or responding to actual incidents. (3) Personnel Development and Communication Systems Level: A basic training curriculum on crisis and emergency management (CEM) should be developed for personnel at all levels involved in airport emergency plans. Emphasis should be placed on simulation-based training, including tabletop exercises and full-scale emergency drills based on the airport's emergency plan. This is especially important for compound incidents and complex emergency scenarios requiring a coordinated multi-agency response.

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