APPLYING THE SERVQUAL MODEL TO AIRPORT TECHNOLOGY DISRUPTIONS: SERVICE QUALITY GAPS, OPERATIONAL RESILIENCE, AND PASSENGER PERCEPTION DURING FLIGHT DELAYS AND CANCELLATIONS

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Abstract

Airport operations have become increasingly dependent on complex digital and information technology systems, including airline reservation platforms, flight information display systems, passenger processing applications, and baggage handling networks. While these systems enhance efficiency and service integration under normal conditions, failures within airport technology networks frequently lead to widespread flight delays and cancellations. Such disruptions not only affect operational performance but also significantly influence passengers' perceptions of service quality, trust, and satisfaction. Existing studies on airport service quality have largely focused on routine operating conditions or aviation-specific service evaluation models. However, limited attention has been given to conceptualizing airport technology disruptions through classical service quality theory. Addressing this gap, this study adopts the SERVQUAL model to examine how service quality dimension's reliability, responsiveness, assurance, empathy, and tangibles shape passenger perceptions during technology-induced flight delays and cancellations. Methodologically, this research employs a conceptual research design based on theory integration and analytical synthesis of prior literature**.** The study develops a conceptual framework that links airport technology disruptions with SERVQUAL service quality gaps and operational resilience principles in aviation management. The paper contributes theoretically by extending SERVQUAL into the context of airport disruption management and practically by offering insights for airport authorities and airlines seeking to enhance passenger-centered resilience strategies during irregular operations.

Keywords: SERVQUAL, Airport Technology Disruptions, Flight Delays, Flight Cancellations, Service Quality, Operational Resilience

Introduction

Airports are complex service organizations that rely heavily on integrated digital and information technology systems to support daily operations. Modern airport environments depend on interconnected platforms for flight scheduling, air traffic coordination, passenger check-in and boarding, baggage handling, security screening, and real-time information dissemination. These systems are designed to improve efficiency, reduce operational uncertainty, and enhance passenger experience. However, increasing technological dependence has also introduced significant vulnerabilities into airport operations.

Technology disruptions at airports may occur as a result of system outages, software malfunctions, hardware failures, cyberattacks, or power interruptions. Due to the highly interconnected nature of airport systems, even a localized failure can trigger cascading effects across multiple operational functions, leading to widespread flight delays and cancellations. According to aviation industry reports,

technology-related disruptions have become a growing contributor to irregular operations, generating substantial financial losses and reputational damage for both airports and airlines (International Civil Aviation Organization [ICAO], 2020).

From a passenger perspective, flight delays and cancellations represent critical service failure events. While operational disruptions may be unavoidable, passengers tend to evaluate airports and airlines not only based on the occurrence of such disruptions but also on how effectively service providers manage, communicate, and recover from them. Prior research suggests that inadequate communication, inconsistent information, and slow service recovery significantly exacerbate passenger dissatisfaction during irregular operations (Fodness & Murray, 2007; Park & Cho, 2020)

Despite the growing importance of passenger experience in airport competitiveness, much of the existing literature on airport disruption management has emphasized technical resilience, operational efficiency, and system reliability. Comparatively fewer studies have examined airport technology disruptions through the lens of service quality theory. Traditional airport service quality studies often focus on routine service encounters, such as terminal facilities, convenience, and process efficiency, rather than disruption scenarios characterized by uncertainty and stress (Bezerra & Gomes, 2016).

Service quality theory offers a valuable perspective for understanding passenger reactions during irregular operations. The SERVQUAL model, developed by Parasuraman, Zeithaml, and Berry (1988), conceptualizes service quality as the gap between customer expectations and perceived service performance across five dimensions: reliability, responsiveness, assurance, empathy, and tangibles. While SERVQUAL has been widely applied across various service industries, its application to airport technology disruption contexts remains limited.

Despite the growing importance of passenger experience in airport competitiveness, much of the existing literature on airport disruption management has focused primarily on technical resilience, infrastructure robustness, and operational recovery efficiency. While these studies provide valuable insights into system performance and operational continuity, they often overlook the service quality implications of disruptions from the passenger perspective.

In practice, passengers rarely evaluate airport disruptions based on technical causes such as system outages or cybersecurity failures. Instead, their perceptions are largely shaped by how airports and airlines communicate information, provide assistance, and manage service recovery during delays and cancellations. Consequently, technology-induced disruptions should not be understood solely as operational failures but also as service quality gap events that directly influence passenger perceptions and satisfaction.

However, the application of classical service quality theory, particularly the SERVQUAL model, to the context of airport technology disruptions remains limited. Existing airport service quality research has predominantly examined routine service encounters such as terminal facilities, processing efficiency, and convenience under normal operating conditions (Bezerra & Gomes, 2016). Comparatively fewer studies have explored how service quality dimensions influence passenger evaluations during irregular operations characterized by uncertainty, stress, and operational instability.

Addressing this gap, this paper conceptualizes airport technology disruptions as SERVQUAL-based service quality gap events and proposes a conceptual framework integrating service quality theory with principles of airport operational resilience. By doing so, the study provides a theoretical explanation of how service quality dimensions shape passenger perceptions during technology-induced flight delays and cancellations.

Accordingly, the objectives of this paper are threefold. First, it aims to examine how SERVQUAL dimensions shape passenger perceptions during airport technology disruptions. Second, it seeks to conceptualize flight delays and cancellations as service quality gap events intensified by

system failures and inadequate recovery responses. Third, the paper proposes a SERVQUAL-based conceptual framework that integrates service quality theory with principles of operational resilience in airport management.

Airport Technology Disruptions and Service Failure Context

Airport operations are increasingly characterized by high levels of technological integration. Core operational functions—such as flight scheduling, passenger processing, baggage handling, and air traffic coordination—are supported by interconnected information systems shared among multiple stakeholders, including airports, airlines, ground service providers, and air navigation service providers. While such integration enhances coordination and efficiency, it also increases system complexity and vulnerability.

Technology disruptions in airport environments can be broadly categorized into system outages, software and hardware failures, cybersecurity incidents, and infrastructure-related disruptions. System outages may arise from software bugs, system upgrades, or power failures, temporarily disabling critical platforms such as flight information display systems or airline reservation systems. Hardware failures, particularly in legacy systems, further heighten operational risk due to limited redundancy and maintenance constraints (ICAO, 2020).

Cybersecurity threats represent an additional and growing source of disruption. Airports have become attractive targets for cyberattacks due to their critical infrastructure status and reliance on digital networks. Cyber incidents, including ransomware attacks and distributed denial-of-service (DDoS) attacks, have the potential to paralyze essential airport functions, disrupt flight schedules, and compromise passenger data security (SITA, 2021). Even short-duration cyber incidents can result in extensive delays and cancellations, highlighting the fragility of technology-dependent operations.

From a service perspective, technology disruptions often manifest as service failures experienced directly by passengers. Service failure occurs when service performance falls below customer expectations, leading to dissatisfaction and negative emotional responses (Bitner, Booms, & Tetreault, 1990). In airport contexts, technology-induced service failures may include inaccurate or delayed flight information, prolonged waiting times, missed connections, and inadequate assistance during rebooking processes.

Importantly, passengers typically have limited visibility into the technical causes of disruptions. As a result, their evaluations are shaped primarily by service encounters and recovery processes rather than by technical explanations. Research on service recovery and recovery suggests that passengers are more likely to tolerate disruptions when service providers demonstrate transparency, responsiveness, and empathy (Grönroos, 1984; Fodness & Murray, 2007). Conversely, poor communication and slow recovery responses intensify negative perceptions, even when disruptions are unavoidable.

Viewing airport technology disruptions through a service failure lens underscores the relevance of service quality theory in explaining passenger perceptions during irregular operations. Rather than treating disruptions solely as operational breakdowns, conceptualizing them as service quality gap events allows for a more comprehensive understanding of passenger experience and provides a foundation for developing passenger-centered resilience strategies.

1. SERVQUAL Theory and its Application in Airport Service Contexts

1.1 Overview of SERVQUAL Theory

The SERVQUAL model, originally developed by Parasuraman, Zeithaml, and Berry (1988), is one of the most influential frameworks for assessing service quality across a wide range of service industries. SERVQUAL conceptualizes service quality as the discrepancy between customers' expectations prior to service consumption and their perceptions of actual service performance.

According to this perspective, service quality is not determined solely by technical outcomes but by customers' subjective evaluations of service encounters.

Parasuraman et al. (1988) proposed five core dimensions of service quality: reliability, responsiveness, assurance, empathy, and tangibles. These dimensions collectively capture both functional and interactional aspects of service delivery. Subsequent refinements of the SERVQUAL scale further emphasized its diagnostic capability in identifying specific service quality gaps that contribute to customer dissatisfaction (Parasuraman, Zeithaml, & Berry, 1991).

One of the key theoretical contributions of SERVQUAL lies in its gap model. The SERVQUAL gap model identifies multiple gaps that may arise during service delivery, including gaps between customer expectations and management perceptions, between service specifications and delivery, and between expected and perceived service. These gaps provide a structured explanation of why service failures occur and how they influence customer perceptions. In disruption contexts, such gaps are often magnified, making SERVQUAL particularly relevant for analyzing service breakdowns and recovery processes

1.2 SERVQUAL as a Framework for Service Failure and Recovery

Service failure literature suggests that service quality assessments are especially salient during irregular or failure situations, as customers are more likely to reassess their expectations and perceptions when service delivery is disrupted (Bitner et al., 1990). In such contexts, customers often place greater emphasis on how service providers respond to failures rather than on the failure itself. SERVQUAL offers a systematic framework for understanding these evaluations by linking service recovery actions to specific quality dimensions.

Reliability and responsiveness have been consistently identified as the most critical SERVQUAL dimensions in service failure contexts. Reliability reflects the ability to deliver services accurately and dependably, while responsiveness captures the speed and effectiveness of service recovery efforts. Studies across transportation and hospitality industries indicate that failures in these dimensions significantly intensify customer dissatisfaction, particularly when delays or disruptions persist without clear communication or resolution (Grönroos, 1984; Fodness & Murray, 2007).

Assurance and empathy become increasingly important during high-stress service encounters, such as flight delays and cancellations. Assurance relates to customers' confidence in service personnel's competence and professionalism, while empathy reflects the extent to which customers feel understood and cared for. Research suggests that empathetic communication and professional demeanor can mitigate negative emotional responses during service disruptions, even when operational outcomes cannot be immediately improved (Park & Cho, 2020).

Tangibles, although often considered less critical than other dimensions, also play a meaningful role during extended disruptions. Physical facilities, signage, service counters, and visible support resources contribute to customers' perceptions of preparedness and organizational competence. In airport environments, inadequate tangibles during prolonged delays may exacerbate perceptions of chaos and inefficiency, further widening service quality gaps.

1.3 Application of SERVQUAL in Airport and Aviation Studies

SERVQUAL has been widely applied in aviation-related research to examine passenger perceptions of airline and airport services. Previous studies have employed SERVQUAL to assess airline service quality, airport terminal services, and ground handling performance under normal operating conditions. These studies generally confirm that reliability, responsiveness, and assurance are strong predictors of passenger satisfaction and behavioral intentions in aviation contexts (Chen & Chang, 2005; Park, Robertson, & Wu, 2006).

However, much of the existing SERVQUAL-based aviation research focuses on routine service encounters, such as check-in efficiency, in-flight service quality, and terminal facilities. Comparatively fewer studies explicitly address irregular operations, particularly those caused by technology disruptions. This represents a notable gap in the literature, given the increasing frequency and impact of technology-induced delays and cancellations.

Airport environments differ from many other service settings due to their high levels of uncertainty, interdependence, and time sensitivity. Passengers often have limited control over outcomes and rely heavily on information provided by service personnel and digital systems. Under such conditions, SERVQUAL dimensions related to communication, responsiveness, and assurance become particularly salient. Applying SERVQUAL to airport technology disruptions allows for a structured analysis of how failures in information systems and recovery processes translate into perceived service quality gaps.

1.4 SERVQUAL and Technology-Induced Service Quality Gaps

Technology disruptions introduce unique challenges to service quality management in airports. When digital systems fail, service delivery processes are interrupted, often resulting in inaccurate information, delayed assistance, and inconsistent recovery responses. From a SERVQUAL perspective, such disruptions simultaneously affect multiple service quality dimensions.

Reliability gaps emerge when passengers receive conflicting or outdated information due to system outages. Responsiveness gaps arise when service personnel are unable to provide timely assistance because they lack access to functional systems or decision-support tools. Assurance gaps may occur if staff appear uncertain or unprepared to manage disruptions, undermining passenger confidence. Empathy gaps become evident when overwhelmed service personnel are unable to provide individualized attention during high-volume disruption scenarios. Tangibles gaps may be observed when physical infrastructure and visible support mechanisms are insufficient to accommodate large numbers of disrupted passengers.

Conceptualizing technology disruptions as SERVQUAL gap events highlights the interconnected nature of service quality dimensions in airport environments. Rather than viewing technology failures as isolated technical incidents, SERVQUAL emphasizes their downstream effects on passenger perceptions and service evaluations. This perspective aligns with service-dominant logic, which emphasizes value co-creation and customer experience as central elements of service systems.

1.5 Relevance of SERVQUAL for Airport Operational Resilience

Operational resilience in airports is commonly defined as the ability to anticipate, absorb, adapt to, and recover from disruptions while maintaining acceptable levels of service. While resilience research has traditionally focused on infrastructure robustness and system redundancy, recent studies highlight the importance of incorporating human and service-related factors into resilience planning (ICAO, 2020).

SERVQUAL provides a complementary lens for operational resilience by emphasizing passenger perceptions and service recovery quality. A resilient airport is not only one that restores operations quickly but also one that manages passenger expectations and experiences effectively during disruptions. By aligning SERVQUAL dimensions with resilience principles, airports can develop more holistic strategies that address both technical recovery and service quality restoration.

In this study, SERVQUAL is positioned as a theoretical bridge between service quality management and airport operational resilience. By applying SERVQUAL to technology-induced delays and cancellations, the paper extends service quality theory into a critical but underexplored aviation context and lays the foundation for a conceptual framework integrating service quality gaps with resilience-oriented disruption management.

Research Methodology: Conceptual Study Design

This study adopts a conceptual research design aimed at developing a theoretical framework that explains how airport technology disruptions influence passenger perceptions through service quality gaps. Conceptual research focuses on theory integration, analytical reasoning, and synthesis of existing literature rather than empirical data collection.

The methodological approach of this study involves a systematic review and analytical synthesis of prior literature in three primary research domains: service quality theory, airport service management, and operational resilience in aviation systems. Foundational theories of service quality, particularly the SERVQUAL model proposed by Parasuraman, Zeithaml, and Berry (1988), provide the theoretical basis for examining how passengers evaluate service performance during disruption scenarios.

Relevant aviation and airport management literature was also examined to identify the operational characteristics of airport technology disruptions, including system outages, cybersecurity incidents, and digital infrastructure failures. By integrating these perspectives, the study develops a conceptual framework that links airport technology disruptions with service quality gaps across the five SERVQUAL dimensions: reliability, responsiveness, assurance, empathy, and tangibles.

Following established approaches in conceptual research, the framework development process involved three stages. First, key constructs and theoretical relationships were identified through literature review. Second, the relationships between technology disruptions and service quality gaps were analytically interpreted within the SERVQUAL gap model. Third, formal research propositions were derived to explain how these service quality gaps influence passenger perceptions during flight delays and cancellations.

The resulting framework provides a theoretical foundation for future empirical research examining passenger responses to airport technology disruptions and offers a structured basis for investigating service quality management within airport operational resilience strategies.

2. Conceptual Framework: Integrating SERVQUAL and Airport Operational Resilience

2.1 Rationale for an Integrated Conceptual Framework

Airport technology disruptions represent complex events in which technical failures, operational breakdowns, and service delivery challenges intersect. Traditional approaches to airport disruption management have predominantly emphasized infrastructure robustness, system redundancy, and operational recovery speed. While these elements are essential, they do not fully explain passenger reactions during delays and cancellations, nor do they adequately address service quality perceptions that shape trust and satisfaction.

Service quality theory, particularly the SERVQUAL model, provides a complementary perspective by focusing on how passengers evaluate service performance during both normal and irregular operations. Integrating SERVQUAL with airport operational resilience allows for a more holistic understanding of disruption management, recognizing that resilience is not only a technical capability but also a service-oriented process experienced by passengers. This integration responds to recent calls in aviation research to adopt passenger-centered approaches to resilience and recovery (ICAO, 2020; SITA, 2021).

Accordingly, this paper proposes a conceptual framework that positions airport technology disruptions as triggers that activate service quality gaps across SERVQUAL dimensions, which in turn influence passenger perceptions and overall service evaluations during flight delays and cancellations.

2.2 Airport Technology Disruptions as Triggers of Service Quality Gaps

In the proposed framework, airport technology disruptions are conceptualized as initiating events that disrupt service delivery processes. These disruptions may originate from system

outages, software failures, cybersecurity incidents, or infrastructure breakdowns. Regardless of the technical source, such disruptions often produce similar service-level consequences from a passenger perspective, including inaccurate information, prolonged waiting times, and uncertainty regarding travel arrangements.

From a SERVQUAL perspective, technology disruptions widen the gap between passenger expectations and perceived service performance. Passengers generally expect airports and airlines to provide reliable information, prompt assistance, and professional service even under adverse conditions. When technology failures impede these expectations, service quality gaps emerge across multiple SERVQUAL dimensions (Parasuraman et al., 1988). These gaps form the core explanatory mechanism linking disruptions to negative passenger perceptions.

2.3 SERVQUAL Dimensions within the Resilience Framework

The conceptual framework integrates each SERVQUAL dimension as a distinct but interrelated pathway through which technology disruptions affect passenger perceptions.

Reliability is positioned as the foundational dimension within the framework. Technology failures directly undermine reliability by disrupting information accuracy and operational consistency. When flight information systems fail or produce conflicting updates, passengers perceive a breakdown in dependable service delivery, intensifying dissatisfaction.

Responsiveness represents the airport's and airline's capacity to react promptly and effectively to disruptions. In resilience terms, responsiveness reflects adaptive capacity—the ability to adjust service processes and provide timely recovery actions. Delays in rebooking, assistance, or communication exacerbate service quality gaps and heighten passenger frustration (Fodness & Murray, 2007).

Assurance captures passengers' confidence in service personnel and organizational competence during disruptions. Technology failures often place frontline staff under pressure, requiring them to manage uncertainty while maintaining professionalism. In the framework, assurance functions as a trust-building mechanism that can buffer the negative effects of operational uncertainty on passenger perceptions (Park & Cho, 2020).

Empathy reflects the human dimension of resilience. During delays and cancellations, passengers experience stress, fatigue, and emotional strain. Empathetic interactions, individualized attention, and respectful communication can reduce perceived service quality gaps, even when technical recovery is slow. Empathy thus plays a critical moderating role in shaping passenger tolerance of disruptions.

Tangibles represent the visible and physical aspects of service delivery that support passengers during irregular operations. Adequate seating, signage, service counters, and support facilities contribute to perceptions of preparedness and organizational capability. In prolonged disruptions, insufficient tangibles amplify negative service evaluations and reinforce perceptions of chaos.

2.4 Linking SERVQUAL to Passenger Perception and Service Evaluation

The integrated framework proposes that service quality gaps across SERVQUAL dimensions collectively shape passengers' overall perceptions of airport and airline performance during technology-induced delays and cancellations. Rather than responding solely to the occurrence of disruptions, passengers evaluate how effectively service providers manage the disruption experience

This perspective aligns with service recovery literature, which suggests that customers often remember how failures were handled more vividly than the failure itself (Bitner et al., 1990). In airport contexts, effective communication, visible recovery efforts, and empathetic service

interactions can partially compensate for operational shortcomings, mitigating negative perceptions and preserving trust.

Within the framework, passenger perception is conceptualized as an outcome variable influenced by the combined effects of SERVQUAL dimensions. These perceptions subsequently inform broader service evaluations, including satisfaction, trust, and future behavioral intentions, such as willingness to reuse the airport or recommend its services.

2.5 Conceptual Contribution to Airport Operational Resilience

By integrating SERVQUAL with operational resilience, the proposed framework extends existing resilience models beyond technical and infrastructural considerations. It emphasizes that resilience should be evaluated not only in terms of recovery speed or operational continuity but also through passengers' subjective experiences during disruptions.

This service-oriented interpretation of resilience highlights the importance of aligning technical recovery strategies with service quality management. Airports that restore systems quickly but fail to manage passenger expectations and experiences may still suffer reputational damage and loss of trust. Conversely, airports that effectively manage service quality gaps may preserve passenger satisfaction even when technical recovery is prolonged.

The framework thus contributes conceptually by positioning SERVQUAL as a diagnostic and explanatory tool within airport disruption management. It provides a structured basis for future empirical research examining the relationships between technology disruptions, service quality gaps, and passenger outcomes, while also offering practical insights for designing passenger-centered resilience strategies.

2.6 Research Propositions

Based on the conceptual framework developed in this study, several research propositions are proposed to explain how airport technology disruptions influence passenger perceptions through service quality gaps.

Proposition 1 (P1): Airport technology disruptions negatively affect perceived service reliability by reducing the accuracy and consistency of flight information and operational processes.

Proposition 2 (P2): Airport technology disruptions increase the importance of service responsiveness, as passengers rely on timely assistance, communication, and service recovery actions during delays and cancellations.

Proposition 3 (P3): Passenger perceptions of assurance during technology disruptions are positively influenced by the competence, professionalism, and confidence demonstrated by frontline service personnel.

Proposition 4 (P4): Empathetic service interactions moderate negative passenger reactions during flight delays and cancellations caused by technology disruptions.

Proposition 5 (P5): Adequate tangible support resources, including physical facilities and visible service infrastructure, mitigate negative passenger perceptions during prolonged disruption scenarios.

Proposition 6 (P6): Service quality gaps across SERVQUAL dimensions collectively influence passengers' overall evaluation of airport performance during technology-induced flight delays and cancellations.

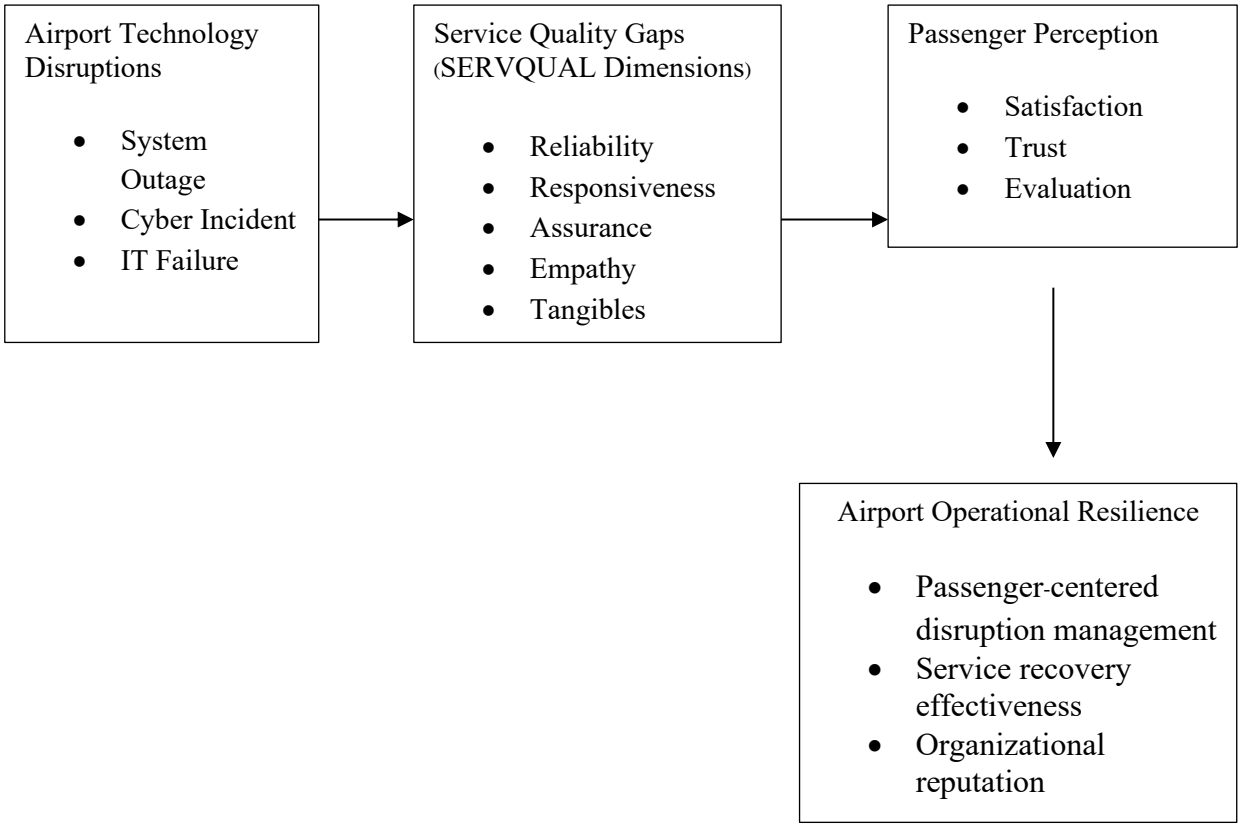

Figure 1: Conceptual Framework: SERVQUAL-Based Airport Disruption Model

3. Discussion: Interpreting SERVQUAL-Based Resilience in Airport Disruption Contexts

This section discusses the theoretical implications of applying the SERVQUAL model to airport technology disruptions and interprets the proposed conceptual framework in relation to existing service quality, service recovery, and airport resilience literature. By framing technology-induced flight delays and cancellations as service quality gap events, this study offers a novel perspective on disruption management that extends beyond traditional operational efficiency paradigms

3.1 Airport Technology Disruptions as Service Quality Gap Events

The SERVQUAL-based framework proposed in this paper conceptualizes airport technology disruptions as events that simultaneously trigger multiple service quality gaps. Unlike routine service encounters, disruption scenarios intensify the discrepancy between passenger expectations and perceived service performance. Passengers generally expect airports and airlines to maintain a minimum level of reliability, communication, and support even under adverse conditions. When technology failures disrupt these expectations, negative perceptions emerge rapidly.

This interpretation aligns with the original SERVQUAL gap model, which emphasizes that service failures often stem not only from technical shortcomings but also from misalignments between customer expectations and managerial responses (Parasuraman et al., 1988). In airport environments, technology disruptions magnify these misalignments by limiting information accuracy, slowing service recovery, and constraining frontline staff's ability to respond effectively. As a result, service quality gaps become more salient and more consequential for passenger evaluations.

By reframing delays and cancellations as service quality gap events rather than isolated operational failures, this study contributes to a more comprehensive understanding of disruption impacts in aviation contexts.

3.2 Reinterpreting Operational Resilience through a Service Quality Lens

Operational resilience in aviation has traditionally been associated with infrastructure robustness, redundancy, and recovery speed. While these elements remain critical, the SERVQUAL-based framework suggests that resilience should also be evaluated through passengers' subjective experiences during disruptions. A technically resilient airport that restores systems quickly may still be perceived negatively if passengers experience poor communication, lack of assistance, or indifferent service attitudes.

The discussion highlights that SERVQUAL dimensions function as experiential indicators of resilience from the passenger perspective. Reliability and responsiveness reflect the airport's ability to maintain functional continuity and adaptive capacity, while assurance and empathy capture the human and relational aspects of resilience. Tangibles, although often overlooked, provide visible cues of preparedness and organizational control during irregular operations.

This service-oriented interpretation of resilience aligns with recent aviation policy discussions emphasizing passenger-centric approaches to airport management (ICAO, 2020). It also resonates with broader service management literature, which argues that resilience should encompass both operational performance and customer experience outcomes.

3.3 Dominant SERVQUAL Dimensions in Disruption Contexts

The discussion further suggests that not all SERVQUAL dimensions exert equal influence during airport technology disruptions. Consistent with service failure and recovery literature, reliability and responsiveness appear to be the most critical determinants of passenger perception during delays and cancellations. Technology failures directly undermine reliability by disrupting information accuracy and schedule predictability, while responsiveness reflects the effectiveness of recovery actions such as rebooking, assistance, and communication.

Assurance and empathy play a moderating role by shaping passengers' emotional responses and tolerance levels. When frontline staff demonstrate competence, confidence, and genuine concern, passengers may perceive disruptions as being managed professionally, even if operational outcomes remain unfavorable. These findings are consistent with previous aviation studies emphasizing the importance of staff behavior and communication quality during irregular operations (Fodness & Murray, 2007; Park & Cho, 2020).

Tangibles contribute indirectly by influencing comfort and perceived preparedness during extended disruptions. Poor physical conditions and inadequate support facilities may exacerbate frustration and reinforce negative service evaluations, particularly in prolonged delay scenarios.

3.4 Implications for Service Recovery and Passenger Trust

The SERVQUAL-based framework underscores the central role of service recovery in shaping passenger trust during airport technology disruptions. Trust is not solely a function of on-time performance but also of how transparently and empathetically service providers manage failure situations. Passengers are more likely to maintain trust when they perceive that service providers are honest, proactive, and attentive to their needs.

This discussion supports the view that effective service recovery can partially offset operational shortcomings. Even when technology disruptions are unavoidable, managing service quality gaps through timely communication, professional conduct, and empathetic responses can mitigate negative perceptions and preserve long-term relationships with passengers. Such insights

reinforce the relevance of SERVQUAL as a diagnostic tool for evaluating disruption management strategies in aviation contexts.

3.5 Theoretical Contributions and Positioning within Existing Literature

The discussion highlights several theoretical contributions of this study. First, it extends SERVQUAL theory into a high-risk, technology-dependent service context characterized by uncertainty and time sensitivity. While SERVQUAL has been widely applied under normal service conditions, its application to airport disruption management remains limited. This study addresses that gap by demonstrating its relevance in explaining passenger perceptions during irregular operations.

Second, the integration of SERVQUAL with operational resilience literature provides a conceptual bridge between service quality management and disruption resilience. By linking service quality gaps to resilience outcomes, the framework enriches existing models that have traditionally emphasized technical recovery without fully accounting for passenger experience.

Finally, the SERVQUAL-based discussion provides a foundation for future empirical research. The conceptual relationships proposed in this paper can be operationalized through quantitative or mixed-method studies to examine how specific service quality gaps influence passenger satisfaction, trust, and behavioral intentions during technology-induced delays and cancellations.

4. Practical Implications for Airport and Airline Management

The SERVQUAL-based conceptual framework proposed in this study offers several practical implications for airport authorities, airlines, and aviation stakeholders seeking to improve disruption management and passenger experience during technology-induced delays and cancellations. By interpreting airport technology disruptions as service quality gap events, managers can adopt more comprehensive, passenger-centered approaches to operational resilience.

4.1 Reframing Technology Disruptions as Service Quality Management Issues

One of the key managerial implications of this study is the need to reframe airport technology disruptions beyond purely technical or operational problems. While infrastructure robustness and system redundancy remain essential, disruption management should also be approached as a service quality management issue. Airport managers should recognize that passengers primarily evaluate disruptions through their service experiences rather than technical explanations.

Applying SERVQUAL as a diagnostic tool enables managers to identify specific service quality gaps that emerge during technology failures. For example, persistent reliability gaps may indicate weaknesses in information accuracy and system backup procedures, while responsiveness gaps may reflect limitations in service recovery protocols or staff coordination. Viewing disruptions through this lens supports more targeted interventions aimed at improving passenger perceptions and satisfaction.

4.2 Enhancing Communication and Information Reliability

Reliable and transparent communication is central to effective disruption management. Technology disruptions often impair information systems, resulting in inconsistent or delayed updates that exacerbate passenger frustration. Airport authorities and airlines should prioritize investments in resilient communication platforms that ensure continuous information flow even when primary systems fail.

From a SERVQUAL perspective, maintaining reliability and responsiveness in communication reduces uncertainty and builds passenger trust. Practical measures may include redundant communication channels, mobile-based notifications, and coordinated messaging among stakeholders. Research suggests that timely and accurate information significantly mitigates negative passenger reactions during delays and cancellations (Fodness & Murray, 2007; SITA, 2021).

4.3 Strengthening Frontline Staff Capability and Assurance

Frontline staff play a critical role in translating organizational resilience into passenger experience. During technology disruptions, staff are often required to manage high volumes of inquiries while operating under uncertainty. Enhancing staff capability through training programs focused on crisis communication, problem-solving, and service recovery can strengthen assurance and empathy dimensions of service quality.

Airport and airline managers should ensure that frontline personnel have access to up-to-date information and decision-making authority to respond effectively to passenger needs. Professional demeanor, confidence, and consistent explanations help reassure passengers and preserve trust during irregular operations (Park & Cho, 2020). Such investments in human capital complement technical resilience measures and contribute to overall service quality restoration.

4.4 Designing Empathetic Service Recovery Strategies

Empathy is a critical but often underemphasized component of disruption management. Passengers affected by delays and cancellations experience stress, fatigue, and emotional discomfort, particularly during extended disruptions. Service recovery strategies should therefore incorporate empathetic elements that acknowledge passenger inconvenience and demonstrate genuine concern.

Practical initiatives may include proactive assistance for vulnerable passengers, clear explanations of available options, and visible efforts to alleviate discomfort, such as providing amenities or flexible rebooking arrangements. Empathetic service interactions can moderate negative perceptions and enhance passengers' tolerance of unavoidable disruptions, reinforcing long-term loyalty.

4.5 Improving Tangible Support and Physical Environment Readiness

The physical environment of airports plays a significant role in shaping passenger perceptions during prolonged disruptions. Adequate seating, signage, service counters, and visible support facilities contribute to perceptions of preparedness and organizational control. Poor tangibles, by contrast, amplify frustration and reinforce negative evaluations of service quality.

Airport authorities should assess terminal layouts and support facilities from a disruption management perspective, ensuring that physical resources can accommodate large numbers of disrupted passengers. Aligning tangible resources with SERVQUAL principles enhances visible resilience and supports service recovery efforts during technology-induced irregular operations.

4.6 Integrating SERVQUAL into Airport Collaborative Decision-Making

Effective disruption management in airports requires coordination among multiple stakeholders, including airport operators, airlines, ground service providers, and air navigation service providers. Integrating SERVQUAL principles into airport collaborative decision-making (A-CDM) frameworks can enhance passenger-centered resilience strategies.

By incorporating service quality considerations into joint decision-making processes, stakeholders can align operational recovery priorities with passenger experience objectives. This integration supports more holistic resilience planning that balances technical recovery with service quality restoration, ultimately reducing the negative impacts of technology disruptions on passengers and organizational reputation.

Conclusion and Directions for Future Research

This paper set out to examine airport technology disruptions through the lens of service quality theory by applying the SERVQUAL model to the context of flight delays and cancellations. As airports become increasingly dependent on complex digital and information technology systems, technology-induced disruptions have emerged as a persistent challenge affecting both operational performance and passenger experience. While prior studies have largely emphasized technical resilience and

operational efficiency, this paper argues that such disruptions should also be understood as service quality gap events that shape passenger perceptions and service evaluations.

By integrating SERVQUAL with airport operational resilience, the paper provides a conceptual framework that explains how reliability, responsiveness, assurance, empathy, and tangibles collectively influence passenger perceptions during irregular operations. The framework highlights that passenger dissatisfaction during delays and cancellations is not driven solely by the occurrence of disruptions but by how service quality gaps are managed throughout the disruption and recovery process. Effective communication, professional conduct, empathetic interactions, and adequate physical support resources emerge as critical factors in mitigating negative passenger experiences.

The theoretical contribution of this study lies in extending SERVQUAL into a high-risk, technology-dependent aviation context characterized by uncertainty and time sensitivity. By positioning service quality as a core component of operational resilience, the paper bridges service management theory and aviation resilience literature, offering a more holistic understanding of disruption management from a passenger-centered perspective.

From a practical standpoint, the findings underscore the importance of aligning technical recovery strategies with service quality management. Airports and airlines that invest in both technological resilience and service recovery capability are better positioned to preserve passenger trust and satisfaction during unavoidable disruptions. Viewing disruption management through a SERVQUAL lens enables managers to diagnose service quality gaps systematically and design more effective, passenger-focused resilience strategies.

Directions for Future Research

As a conceptual academic paper, this study provides a foundation for future empirical and methodological research in airport disruption management. Several directions for future research are suggested.

First, empirical studies could operationalize the proposed SERVQUAL-based framework through quantitative survey research. Future studies may develop and validate measurement instruments that assess service quality gaps during technology-induced delays and cancellations, examining their effects on passenger satisfaction, trust, and behavioral intentions. Such studies would provide empirical support for the conceptual relationships proposed in this paper.

Second, comparative studies across different airport contexts and cultural settings would enhance understanding of how passenger expectations and service quality perceptions vary internationally. Differences in cultural norms, travel purposes, and regulatory environments may influence the relative importance of SERVQUAL dimensions during disruptions, offering valuable insights for global airport management.

Third, future research could integrate digital transformation and emerging technologies into the SERVQUAL-resilience framework. The growing use of artificial intelligence, predictive analytics, and real-time data sharing presents opportunities to enhance both technical recovery and service quality management. Examining how digital tools support or reshape SERVQUAL dimensions during disruption scenarios would contribute to the evolving literature on smart and resilient airports.

Finally, qualitative and mixed-method approaches may provide deeper insights into passenger emotions, coping strategies, and service interactions during prolonged disruptions. Interviews, observations, and case studies could complement quantitative findings by capturing nuanced aspects of passenger experience that are difficult to measure through surveys alone.

In conclusion, this paper emphasizes that managing airport technology disruptions effectively requires more than restoring systems and schedules. By incorporating service quality theory into resilience planning, airports and airlines can better address passenger needs, enhance trust, and strengthen long-term competitiveness in an increasingly technology-dependent aviation environment.

References

Bezerra, G. C. L., & Gomes, C. F. (2016). Measuring airport service quality: A multidimensional approach. *Journal of Air Transport Management*, *53*, 85-93. https://doi.org/10.1016/j.jairtraman.2016.01.001

Bitner, M. J., Booms, B. H., & Tetreault, M. S. (1990). The service encounter: Diagnosing favorable and unfavorable incidents. *Journal of Marketing*, *54*(1), 71-84. https://doi.org/10.1177/002224299005400105

Chen, F. Y., & Chang, Y. H. (2005). Examining airline service quality from a process perspective. *Journal of Air Transport Management*, *11*(2), 79-87. https://doi.org/10.1016/j.jairtraman.2004.09.002

Fodness, D., & Murray, B. (2007). Passengers' expectations of airport service quality. *Journal of Services Marketing*, *21*(7), 492-506. https://doi.org/10.1108/08876040710824852

Grönroos, C. (1984). A service quality model and its marketing implications. *European Journal of Marketing*, *18*(4), 36-44. https://doi.org/10.1108/EUM0000000004784

International Civil Aviation Organization. (2020). *Manual on cybersecurity in civil aviation* (Doc 10169).

Parasuraman, A., Zeithaml, V. A., & Berry, L. L. (1988). SERVQUAL: A multiple-item scale for measuring consumer perceptions of service quality. *Journal of Retailing*, *64*(1), 12-40.

Parasuraman, A., Zeithaml, V. A., & Berry, L. L. (1991). Refinement and reassessment of the SERVQUAL scale. *Journal of Retailing*, *67*(4), 420-450.

Park, J. W., & Cho, M. (2020). Passenger service recovery and satisfaction: Evidence from airline delay management. *Sustainability*, *12*(14), 5762. https://doi.org/10.3390/su12145762

Park, J. W., Robertson, R., & Wu, C. L. (2006). Modelling the impact of airline service quality and marketing variables on passengers' future behavioural intentions. *Transportation Planning and Technology*, *29*(5), 359-381. https://doi.org/10.1080/03081060600917686

SITA. (2021). *Air transport IT insights*.