Customer Satisfaction in Airport Baggage Reclaim: Conceptualising a Moderated-Mediated Model of Service Quality and Risk Management

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ABSTRACT: This study conceptualises a moderated-mediation framework to explain customer satisfaction in airport baggage reclaim operations. Customer satisfaction is positioned as the dependent variable, with baggage reclaim handling process serving as the independent variable. Drawing on process improvement and service quality perspectives, the framework proposes service quality as a mediator through which baggage reclaim handling influences customer satisfaction. Efficient, reliable, and transparent baggage reclaim processes are expected to enhance perceptions of service quality, which in turn drive satisfaction. The framework further introduces risk management as a moderator, acknowledging the inherently uncertain and disruption-prone nature of airport operations. Operational risks such as system failures, congestion, and human error can weaken service consistency and undermine customer satisfaction, even when baggage processes are well designed. Effective risk management is therefore a contingency factor that strengthens the effect of the baggage reclaim handling process on customer satisfaction by stabilising service quality under varying operational conditions. Grounded in Process Improvement Theory, SERVQUAL, Expectation–Confirmation Theory, and Contingency Theory, the proposed model explains how operational efficiency translates into customer satisfaction through perceptual evaluations of service quality, while accounting for contextual risk conditions. The study integrates operational, perceptual, and contextual dimensions into a single explanatory framework and offers insights for highlighting the importance of aligning process optimisation with service quality management and robust risk mitigation strategies. The study concludes by encouraging future empirical research to test the proposed moderated-mediation relationships using multivariate statistical techniques and to support data-driven improvements in airport baggage operations and passenger experience.

KEYWORDS: Airport Operations, Baggage Reclaim Handling Process, Customer Satisfaction, Moderated Mediation, Risk Management, Service Quality.

INTRODUCTION

This study adopts a moderated mediated model that explores the interrelationships among Customer Satisfaction (CS), Baggage Reclaim Handling Process (BRHP), Service Quality (SQ), and Risk Management (RM) within airport operations. The model is grounded in service quality and risk management theories and offers a structured lens through which existing research can be synthesised and evaluated. In the model, customer satisfaction serves as the dependent variable. Within the airport context, customer satisfaction reflects passengers' overall evaluation of their experience, with particular attention to service encounters such as baggage handling [1]. Conceptualised as an independent variable, BRHP encompasses operational factors such as timeliness, efficiency, communication, and the condition of returned baggage that shape passengers' perceptions of service delivery at the final stage of their journey [2]. The present study advances a conceptual framework in which BRHP influences Customer Satisfaction indirectly through Service Quality (mediating variable), while the strength of this indirect effect is conditioned by Risk Management (moderating variable). This framework offers a theoretically grounded foundation for future empirical validation using structural equation modeling techniques and provides actionable insights for airport managers seeking to improve both operational performance and the passenger experience.

Customer satisfaction is operationalised as the overall evaluative judgement by passengers after travel that reflects how well their experiences match or exceed their expectations across airline/airport services. According to Mirthipati [3], customer satisfaction is a measurable outcome influenced by improvements in airline service delivery. BRHP is operationalised as the comprehensive sequence of operational activities involved in managing passengers' checked baggage from check-in time to the point of reclaim. This is a

critical process that involves screening, sorting, loading, transportation, unloading and delivery of baggage at the reclaim area upon arrival whose efficiency and reliability is tantamount to affecting customer satisfaction [4], [5]. Service quality is conceptualised as the degree to which perceived actual service performance meets or exceeds passenger expectations. Ighomereho et al. [6] point out that service quality is a subjective evaluation in which customers compare their expectations of a service with the actual performance they receive, forming an attitude based on this expectation–performance gap. Service quality in air travel has been found to influence passengers' willingness to pay, perceived value, and loyalty [7], [8]. Gurtu and Johny [9] define risk management as coordinated strategies and actions an organisation employs to reduce potential threats in order to support the achievement of its goals. In the context of air travel, this calls for a systematic identification, assessment, and mitigation of various risks that may affect reliable service delivery, passenger satisfaction, and business continuity.

Customer satisfaction is understood as a vital performance indicator for airports influencing passenger loyalty, brand reputation, and competitive positioning [10], [11], [12]. Within the broader air-travel journey, baggage reclaim functions as a pivotal service touchpoint where operational efficiency and service dependability intersect to influence passengers' overall perceptions [4]. Delays, mishandling, or inadequate traceability in airport baggage operations are inefficiencies that can substantially erode perceived service quality and overall satisfaction [10]-[12]. Consequently, airports tend to consider operational efficiency principles aimed at optimising baggage-handling processes, minimising operational errors, and improving overall reliability [13], [14]. However, operational efficiency by itself may not guarantee positive passenger experiences, as airports operate under conditions of persistent uncertainty, including technical failures, congestion, and human error [15]. Therefore, the adoption of robust risk-management strategies could mitigate the adverse effects of operational disruptions and help stabilise service delivery, thereby reinforcing passenger trust [16], [15].

This study is structured into the following four sections: introduction, literature review, conceptual framework, and conclusion. The introduction is a window to the study that provides context, background, and significance of the study. It highlights the purpose and operationalises the key concepts involving the conceptualisation of a moderated mediated framework for the study. Following the introductory section, section 2 presents an overview of the literature about customer satisfaction in airport baggage reclaim. The section reviews the related literature pertaining to the influence of baggage reclaim handling process on customer satisfaction through service quality. The section also considers the moderating effect of risk management in the relationship between baggage reclaim handling process and customer satisfaction as well as the relationship between service quality and customer satisfaction. Section 3 presents the conceptual framework of the paper. It conceptualises a moderated mediated framework in which customer satisfaction is a dependent variable, baggage reclaim handling process is an independent variable, service quality is a mediating variable, and risk management is a moderating variable. Section 4 concludes the study on how service quality and risk management could bridge the relationship between BRHP and customer satisfaction and suggests directions for future research.

LITERATURE REVIEW

Customer satisfaction reflects the affective appraisal by passengers of their overall airport experience that is influenced by both service quality perceptions and the underlying process operations [17]. Within the air-transport sector, customer satisfaction is increasingly recognised as a function of operational efficiency, technological integration, and service quality [13], [16]. This shows that satisfaction is influenced both directly and indirectly by operational efficiency and perceived service quality respectively [17]. The Expectation-Confirmation Theory (ECT) provides a theoretical support for this by suggesting that satisfaction arises when performance meets or exceeds passenger expectations.

Among ground-handling operations, the baggage-reclaim process appears to represent a critical determinant of customer satisfaction. According to Arifiani et al. [18], satisfaction is adversely affected by delays, mishandling, poor communication or lack of traceability associated with the baggage reclaim process. These inefficiencies not only disrupt operations but also erode customer trust and satisfaction [12], [15]. This effect is largely attributed to the positioning of baggage reclaim at the final stage of the passenger journey when fatigue is high and expectations for service closure are particularly salient [19], [18].

Baggage reclaim is usually evaluated through experiential cues such as waiting time perception, clarity of information, and staff responsiveness [20], [21]. Accordingly, Arifiani et al. [18] reveal that timely delivery and reliable tracking of the baggage reclaim process improve satisfaction. This is aligned with research grounded in Process Improvement Theory that highlights that optimising baggage handling systems improves throughput reliability, reduces process variability, and minimises service failures [22], [23].

Baggage reclaim handling process is operationalised as the sequence of operations by which luggage is transferred from aircraft arrival to passenger collection, including sorting, tracking, delivery, and handling. Process improvement studies have shown that inefficiencies in inbound baggage systems directly contribute to longer delivery times and increase variability [24]. Advanced baggage handling algorithms and automation have been proposed to optimise throughput and variation in handling systems to bolster operational stability [25]. These operational gains have implications not only for cost and resource efficiency but also for how passengers perceive the service environment, establishing the reclaim process as a foundational antecedent in the customer satisfaction equation.

Baggage reclaim has emerged as a pivotal determinant of customer satisfaction and service quality in contemporary air travel. The increase in global air traffic and hitherto passenger expectations, airports and airlines face continuous challenges to ensure that baggage systems are efficient, reliable, and resilient. Mhlanga [26] points out that baggage handling concerns including delayed, lost, or damaged luggage consistently rank among the top service failures affecting customer experience. As such, Sundararajan [27] asserts that a smooth baggage reclaim process is closely associated with positive customer perceptions of the entire airport experience. Empirical evidence supports the hypothesis that efficient and reliable baggage reclaim handling has a significant positive influence on customer satisfaction. For instance, studies by Alsyouf et al. [28] and Al-Qatawneh et al. [10] demonstrate that process improvements using Lean Six Sigma methodologies lead to measurable reductions in baggage handling times and complaints, which directly enhance customer perceptions of service quality. Likewise, Bitner [29] and Parasuraman et al. [30] have long argued that operational efficiency in service delivery environments is a key determinant of customer satisfaction, especially in high-contact services such as air travel.

However, the influence of baggage reclaim performance on satisfaction does not occur in isolation. This study argues for the mediating role of service quality and moderating role of risk management in this relationship. While operational improvements affect outcomes, their influence on customer satisfaction is largely transmitted through service quality. Service quality mediates the relationship by shaping how passengers perceive the efficiency, responsiveness, and reliability of the baggage reclaim process [13]. For instance, when technological advancements such as Radio Frequency Identification (RFID) tracking or automated notifications are introduced, passengers experience enhanced transparency and reduced uncertainty, which improves perceived service quality [11], [12]. According to Usman et al. [31], empirical research in airport contexts affirms that higher service quality ratings are associated with greater customer satisfaction. For example, a large-scale review of airport passenger reviews identifies cleanliness, seating, signage, Wi-Fi, and staff service as significant predictors of overall service quality perceptions, which in turn influence recommendations and loyalty [32]. In the context of baggage handling, Alanazi et al. [32] highlight that timely delivery, undamaged baggage, and proactive communication significantly improve perceived service quality, even when delays occur.

Service quality theory provides a robust explanatory mechanism linking baggage reclaim handling performance to customer satisfaction. According to the SERVQUAL model, passengers evaluate service encounters based on reliability, responsiveness, assurance, empathy, and tangibles, which collectively shape overall service quality perceptions [30], [33]. In the context of airport operations, empirical evidence consistently shows that improvements in operational processes influence customer satisfaction primarily through their impact on perceived service quality rather than through direct recognition of efficiency gains [34], [2]. This supports the conceptualisation of service quality as a mediating variable between baggage reclaim handling processes and customer satisfaction.

The concept of service recovery also plays an important role in mediating customer responses to baggage-related service failures. According to the service recovery paradox, successful handling of a service failure can paradoxically lead to higher customer satisfaction than if the service had been delivered without failure from the start when a company's approach to resolving a problem exceeds customer's expectations [35]. In baggage reclaim contexts, effective communication, transparency, compensation, and timely response are crucial recovery strategies that can enhance trust and loyalty [36], [37]. Thus, service quality is capable of translating operational performance into meaningful customer-focused outcomes. This role implies that even highly efficient systems must also communicate reliability and cater to the needs of customers to transform operational gains into satisfactory outcomes.

Expectation–Confirmation Theory further strengthens this mediating logic by explaining that satisfaction arises from the comparison between pre-service expectations and post-service performance perceptions [38], [39]. Passengers approach baggage reclaim with expectations shaped by prior travel experiences, airline communication, and airport reputation. When perceived service

quality meets or exceeds these expectations, positive confirmation occurs, leading to higher satisfaction. Conversely, even technically efficient baggage systems may generate dissatisfaction if communication is poor or service encounters appear indifferent [40], [41]. Together, SERVQUAL and Expectation–Confirmation Theory explain how operational performance is translated into evaluative judgments through perceptual mechanisms.

Despite extensive research on airport operations and service quality, the moderating role of risk management in shaping customer satisfaction outcomes remains underdeveloped. Much of the existing literature treats operational disruptions, such as equipment failures, congestion, and labour shortages, as isolated incidents or control variables rather than as contextual conditions that influence service evaluations [42]. Contingency Theory offers a strong theoretical foundation for addressing this gap by arguing that organisational effectiveness depends on the alignment between internal processes and environmental uncertainty [43].

Recent research in supply chain resilience and service risk management demonstrates that proactive risk mitigation enhances service consistency, supports effective recovery, and preserves customer trust during disruptions [44], [45]. In airport settings, passengers tend to be more tolerant of delays when they perceive that risks are anticipated, communication is transparent, and recovery actions are timely and empathetic [46]. The effect of risk management emerges in how effectively airports anticipate, prevent, and respond to disruptions. Risk management strategies strengthen the linkage between process performance and service quality by ensuring operational continuity under variability [14], [16]. Airports that integrate structured risk-management frameworks with process improvement demonstrate higher resilience, translating into more consistent service experiences [15]. This role of risk management underscores that without robust risk control, improvements in baggage processes may not consistently yield superior service quality or customer satisfaction. This supports conceptualising risk management as a moderating variable that strengthens the indirect effect of baggage reclaim handling processes on customer satisfaction by stabilising service quality across varying operational conditions.

According to SITA [16], global baggage mishandling costs the aviation industry approximately US $2.1 billion annually. These operational risks arise from a variety of sources, including human error, system failures, understaffing, and poor inter-organisational coordination [47]. Consequently, proactive and integrated risk management strategies including the IATA Resolution 753 on baggage tracking, automation of baggage handling, and performance monitoring, have become essential in minimising service disruptions and promoting customer satisfaction [48]. Empirical evidence supports the value of risk-based interventions in baggage handling. For instance, in *Improving Baggage Handling Time at an International Airport Using Six Sigma Methodology: A Case Study in the Middle East Region*, Al-Qatawneh et al. [10] use Six Sigma's Define-Measure-Analyse-Improve-Control (DMAIC) approach and find that process optimisation leads to a reduction in baggage handling time by 10.5% to 19%, significantly improving customer satisfaction metrics. Similarly, research conducted at Munich Airport by Wongleedee [47] identifies technological and human resource-related risks as primary drivers of baggage mishandling complaints, stressing the need for comprehensive risk governance that includes both technical and organisational domains.

Research by Tan and Masood [13] and Kovynyov and Mikut [49] highlights how the presence of proactive, technology-enabled risk management systems such as predictive maintenance, real-time tracking, and automated alerts can significantly enhance service reliability during operational disruptions, thereby strengthening the positive impact of baggage reclaim efficiency on customer satisfaction. This is consistent with broader findings in resilience and service operations literature, which emphasise the buffering role of risk management in high-risk, high-volume systems [45], [44]. While empirical work specific to risk management in baggage reclaim remains limited, broader airport operations research underscores how real-time tracking, and contingency planning enhance operational robustness and bolster perceived service quality. Therefore, risk management operates not only as a buffer against operational failure but also as a strategic enhancer of customer satisfaction through prevention, mitigation, and recovery mechanisms.

The preceding discussion underscores the need to investigate customer satisfaction in airport baggage reclaim through an integrated lens. The present study proposes that efficient baggage reclaim handling processes is integrated with effective risk management and high service quality to increase the likelihood that expectations are met, ensure positive confirmation and enhance customer satisfaction. Therefore, satisfaction represents the end outcome of a chain that begins with process efficiency, mediated by service quality perceptions, and contingent upon risk management capability. This is the basis of the proposed moderated-mediation framework for the present study.

By integrating Process Improvement Theory, SERVQUAL, Expectation–Confirmation Theory, and Contingency Theory, this study positions baggage reclaim handling as an operational input whose influence on customer satisfaction is transmitted through service quality perceptions and conditioned by risk management effectiveness. This integrated perspective addresses fragmentation in prior research, which often isolates operational efficiency, service perception, or risk considerations. The resulting framework provides a theoretically coherent and empirically testable foundation for examining customer satisfaction in airport baggage reclaim operations.

CONCEPTUAL FRAMEWORK

This conceptual paper introduces a moderated-mediation tetradic framework in which Customer Satisfaction (CS) serves as a dependent variable (DV), Baggage Reclaim Handling Process (BRHP) as an independent variable (IV), Service Quality (SQ) as a mediator (M), and Risk Management (RM) as a moderator (V). The framework draws upon Process Improvement Theory, SERVQUAL, Expectation-Confirmation Theory, and Contingency Theory to explain the interactions. Through an integrated theoretical framework that is rooted in scientific management, the paper adopts the moderated mediation model 15 [50]. With this model, the paper proposes testing the effect of the moderator on two different paths involving the link between service quality and customer satisfaction and the direct link between BRHP and customer satisfaction as shown in Figure 1 below.
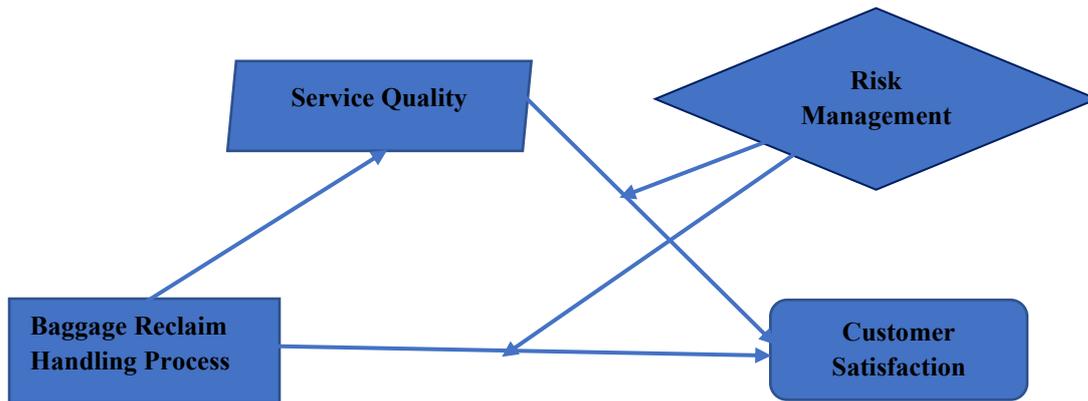

Figure 1. Moderated-Mediated Framework of the Relationship Between Baggage Reclaim Handling Process and Customer Satisfaction.

A moderated-mediated relationship occurs when the strength or direction of a mediation effect depends on a moderator variable. According to Edwards and Lambert [51], moderated mediation represents a situation where "the strength of an indirect effect varies as a function of another variable" (p. 3). Writing on *Addressing Moderated Mediation Hypotheses: Theory, Methods, and Prescriptions*, Preacher et al. [52] point out that "a mediated effect is moderated, such that the magnitude of an indirect effect differs across values of a moderator" (p. 193). As such, Preacher et al. [52] emphasise testing conditional indirect effects across levels of the moderator.

The moderated mediation model above proposes that Baggage Reclaim Handling Process is expected to positively influence customer satisfaction through a variety of factors including efficiency, accuracy, timeliness, automation, and reliability. Prior research has shown that efficient, timely, and reliable baggage handling enhances customer satisfaction by reducing waiting times and baggage mishandling [28], [10]. Thus, the quality of baggage reclaim operations is posited as a direct determinant of customer satisfaction. In this relationship, service quality acts as the pathway through which the efficiency and effectiveness of BRHP influences overall customer satisfaction. When baggage handling is perceived as being efficient, accurate, timely, automated, and reliable, it is expected to lead to high perceived service quality, which is tantamount to increasing customer satisfaction. Conversely, poor baggage handling could decrease both service quality perception and customer satisfaction.

Notwithstanding, the relationship between baggage reclaim handling and customer satisfaction is often complicated by various operational risks including equipment failure, human error, and logistical bottlenecks [53], [49]. These risks could impede service

delivery, causing delays and baggage loss, which adversely affect passenger perceptions and ultimately customer satisfaction [54]. Hence, the effectiveness of risk management practices is crucial for mitigating these disruptions and maintaining service quality.

In this paper, risk management acts as a moderating variable by influencing the strength of the relationship between baggage reclaim handling process and customer satisfaction as well as between service quality and customer satisfaction. The paper posits that airports with robust risk management systems characterised by proactive maintenance, predictive analytics, and contingency planning are in a better position to absorb operational risks and sustain service levels, thereby strengthening the positive effects of efficient baggage handling on customer satisfaction [13], [49]. Conversely, poor risk management systems could weaken this interaction, as even well-designed handling processes could fail to result in satisfactory outcomes if exposed to operational risks that are not properly managed.

Therefore, customer satisfaction is the outcome that is explained or improved through baggage reclaim handling process and perceptions of service quality. However, this relationship is moderated by the effectiveness of risk management practices such that the positive impact of baggage reclaim handling process on customer satisfaction is strong when risk management is strong and weak when risk management is weak.

Pursuant to the proposed moderated-mediation model, BRHP (X) is expected to affect customer satisfaction (Y) both directly and indirectly through service quality (M). At higher levels of risk management (V), the effect of M on Y becomes stronger, causing the indirect effect of X on Y through M to increase. In addition, the direct effect of X on Y varies depending on the level of V, indicating that V moderates not only the mediated path but also the direct path. This conceptual framework suggests that process efficiency must be complemented by perceived service excellence and effective risk-control systems in order to guarantee customer satisfaction.

The above conceptual framework aligns with Process Improvement Theory, SERVQUAL, and Contingency Theory, implying that operational efficiency gains meaning through customer-perceived quality, while risk-management systems sustain those perceptions under uncertainty. The framework provides a structural basis for empirical testing using moderated mediation analysis (Hayes' PROCESS Model 15), which can quantify both the mediating effect of service quality and the moderating effect of risk management in the relationship between baggage reclaim handling process and customer satisfaction.

CONCLUSION

This study proposes a moderated-mediation framework that links baggage reclaim handling process to customer satisfaction, mediated by service quality and moderated by risk management. The model attempts to demonstrate that process improvements enhance satisfaction primarily through service quality, and that the effectiveness of these improvements is contingent upon robust risk-mitigation practices [10], [53], [15].

The proposed framework offers both theoretical contributions by incorporating complementary theories and practical guidance for airport managers seeking to enhance passenger experiences. Theoretical contributions include the integration of Process Improvement Theory, SERVQUAL, Expectation-Confirmation Theory, and Contingency Theory, offering a comprehensive lens to understanding the operational and perceptual determinants of customer satisfaction in airport baggage operations. Practically, the framework guides airport managers to focus not only on streamlining baggage reclaim processes but also on enhancing service quality while investing in technologies and strategies that mitigate operational risks. This integrated approach ensures consistent and positive passenger experiences, even under high passenger volumes or operational uncertainties. The model addresses a critical gap in airport operations research by integrating baggage reclaim handling process, service quality, and risk management into a coherent pathway to customer satisfaction.

The study underscores the critical role that baggage reclaim handling plays in shaping customer satisfaction within airport baggage operations. While efficient and reliable baggage handling directly contributes to positive customer experiences, this relationship is significantly influenced by the delivery of quality service and the organisation's capacity to manage operational risks effectively. Service quality functions as the mediator, translating operational performance into perceived value for passengers. According to Tan and Masood [13], airport digitalisation initiatives enhance service quality by improving reliability, responsiveness, and information accessibility. Thus, a well-managed baggage reclaim process elevates perceived service quality, which in turn heightens customer satisfaction through improved passenger confidence and reduced uncertainty [16], [12]. Future research should focus on empirically validating the proposed mediating role of service quality and the moderating role of risk management across

diverse airport contexts, including varying sizes, geographic regions, and levels of technological adoption. Additionally, investigating other potential moderating or mediating variables such as organisational culture, employee training, or passenger demographics would deepen the understanding of the complex mechanisms driving satisfaction in airport baggage operations.

This study contributes a comprehensive conceptual framework that elucidates how service quality and risk management can bridge baggage reclaim handling processes and customer satisfaction in airport operations. As airports continue to face growing passenger volumes and operational complexities, embracing this integrated perspective will be essential for sustaining competitive advantage and delivering exceptional passenger experiences resulting in customer satisfaction.

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