PANYAPAT
ปัญญาพัฒน์

Academic Article

Review of Airline Industry Quality Control: Ensuring Excellence from Ground to Air

Pornapaktra Sakdaar[1*]

[1]   International school of tourism, Surat Thani Rajabhat University, Thailand

*   Corresponding author. E-mail: pornpaktra.sak@sru.ac.th

ABSTRACT

This review article aims to present the study of airline industry quality control. Significant challenges and opportunities have impacted its global competitiveness since the airline industry's deregulation in 1987. This paper explores critical strategies for quality control in the airline industry, focusing on Strategic Quality Management (SQM), Six Sigma methodologies, Business Process Reengineering (BPR), and Total Quality Management (TQM). SQM integrates TQM principles with strategic goals, promoting continuous improvement and market adaptability. Six Sigma enhances operational efficiency through data-driven approaches, eliminating defects and optimizing processes. BPR significantly boosts productivity by revamping ticketing systems, maintenance routines, and crew scheduling, leading to operational agility and improved customer experiences. Through systematic feedback integration and performance analytics, TQM emphasizes safety, timeliness, and passenger satisfaction. The paper discusses quality control across pre-flight, in-flight, and post-flight services, highlighting their impact on passenger satisfaction and loyalty. Additionally, it addresses challenges such as operational disruptions, technological advancements, cost balancing, staff training, and regulatory compliance. The findings underscore the importance of a holistic, customer-centric approach to quality management, ensuring sustained competitive advantage and market leadership in the dynamic aviation industry. By integrating these strategies, airlines can enhance service quality and operational efficiency, ultimately securing their place in a competitive market and fostering long-term passenger loyalty.

Keywords: Airline Industry, Quality Control, Service Quality

Introduction

Since the airline industry was deregulated in 1987 under the open sky policy, it has faced numerous challenges and opportunities, impacting its global competitiveness. The deregulation has facilitated significant economic contributions, enabling the rapid and widespread transportation of people and goods both locally and globally, which is crucial for long-haul and urgent deliveries. Over the past decade, the industry has primarily been shaped by two business models: full-service airlines

that offer comprehensive services and low-cost airlines that focus on basic services with lower ticket prices.

The International Civil Aviation Organization (ICAO) projected variations in air travel growth until 2015, anticipating a 5.1% annual increase in international traffic and a 3.1% rise in domestic traffic. However, North America's growth was expected to lag at 2.8%, while other regions like the Middle East, Asia/Pacific, Europe, Latin America/Caribbean, and Africa were expected to see about 4% growth, slightly below the global average (ICAO, 2013). The past ten years have also seen downturns due to rising fuel costs, terrorist attacks, epidemics like SARS, and the COVID-19 pandemic, which particularly strained the industry in 2019, leading to numerous airline bankruptcies. These challenges have underscored the importance of robust safety protocols, which have been increasingly prioritized across the industry. Post-COVID-19, the industry began to recover, evidenced by a surge in international flights, particularly through Thai airports, which significantly increased from 156,025 flights in 2022 to 316,253 in 2023 (CAAT, 2023). This recovery phase has been marked by enhanced safety measures and an uptick in travel demand. In the realm of quality control, Strategic Quality Management (SQM) practices play a pivotal role in enhancing the competitiveness and performance of airlines. Techniques like learning organization concepts, ISO 9000 certifications, business process reengineering, and Six Sigma methodologies have been crucial. These practices ensure operational efficiency and elevate customer and employee satisfaction, thereby boosting profitability. The decentralization of decision-making processes further supports continuous quality improvement, which is essential for maintaining competitive advantage.

Significant studies on Ethiopian and Kenyan Airlines have demonstrated how SQM strategies can profoundly impact organizational performance. Furthermore, the contrast between low-cost and legacy airlines reveals that high service quality is crucial for attracting customers and sustaining competitiveness. Research by David Mc A B. (2013) highlighted that low-cost carriers generally provide superior service quality compared to traditional airlines, emphasizing the importance of continuous improvement in service quality to foster customer satisfaction and loyalty.

As the airline industry evolves, maintaining high service quality is crucial to meet rising passenger expectations and enhance satisfaction. This article examines the pivotal role of service quality in the industry's competitive landscape, focusing on how airlines implement Strategic Quality Management (SQM), Total Quality Management (TQM), Six Sigma, and Business Process Reengineering (BPR) to improve service standards consistently. By exploring the relationship between passenger expectations and service quality through these strategies, the study seeks to understand how airlines can thrive by enhancing every aspect of the customer experience.

The systematic review procedure in this article begins by defining a clear research objective, which focuses on examining quality control strategies within the airline industry following its deregulation in 1987. The review mainly investigates the application of Strategic Quality Management (SQM), Six Sigma, Business Process Reengineering (BPR), and Total Quality Management (TQM) in enhancing service quality and operational efficiency. The next step involves conducting an extensive search for relevant literature. This process includes gathering studies and reports that specifically address the implementation and outcomes of these quality control strategies in the airline industry. The selection criteria are carefully designed to include only the most pertinent studies, ensuring the review

remains focused on its objective. Once the relevant literature is identified, it is systematically analyzed to assess the effectiveness of these strategies across different stages of airline operations—pre-flight, in-flight, and post-flight. This analysis compares various case studies to identify best practices and challenges.

Finally, the review synthesizes the findings, providing a comprehensive understanding of how these quality control strategies can be integrated to improve service quality, customer satisfaction, and competitive advantage in the airline industry. This systematic approach ensures a thorough and reliable assessment of quality control practices.

SQM Practices

The strategic orientation of SQM melds quality directly into the strategic blueprint of an airline's mission, harmonizing the continuous improvement ethos of TQM to achieve a distinguished market presence and actualize a forward-thinking corporate vision. This approach is adept at predicting and adapting to the market's changing demands, ensuring that quality initiatives are future-proof and aligned with strategic aims (Kaplan & Norton, 2001). Moreover, the tangible expressions of SQM in the industry, such as introducing pioneering cabin designs, providing tailored in-flight services, and implementing loyalty programs, are not random acts of innovation. Instead, they are strategic measures crafted to amplify the airline's brand identity and reinforce customer loyalty, which is indispensable in securing an airline's competitive advantage and market share (Shaw, 2007; O'Connell & Williams, 2005).

In closing, SQM's deliberate and strategic application, rooted in TQM principles, provides airlines with a robust framework for delivering enhanced service quality, fostering brand loyalty, and securing a competitive stance in the marketplace. The long-term perspective inherent in SQM enables airlines to satisfy immediate quality standards and forge a path toward sustainable business growth and market leadership. Through its strategic underpinnings, SQM in the airline industry exemplifies a commitment to excellence that goes beyond the conventional, positioning airlines to soar to new heights of success and innovation.

However, Service Quality Management (SQM) enhances airline service quality through strategic alignment with Total Quality Management (TQM) principles, promoting continuous improvement and adaptability to market changes. It drives tangible innovations such as advanced cabin designs, personalized in-flight services, and loyalty programs, strengthening brand identity and customer loyalty. SQM's structured framework ensures superior service delivery, brand loyalty, and competitive positioning. Additionally, its long-term perspective supports sustainable business growth and market leadership, ensuring compliance with quality standards and fostering differentiation in the market. This holistic approach ensures airlines' success and sustained competitive advantage.

Six Sigma Methodologies

Six Sigma methodologies provide a crucial framework for enhancing quality and operational efficiency in the aviation industry, where precision and safety are paramount (Pyzdek et al., 2014). Six Sigma's rigorous data-driven approach is instrumental in eliminating defects, reducing variability, and optimizing processes without compromising safety or service quality.

1. Application of Six Sigma in Aviation: Six Sigma ensures that every part of an aircraft complies with the highest reliability standards, a necessity given the potential risks involved. It also optimizes turnaround times, a key performance indicator in the industry, while maintaining the utmost safety standards.

2. Optimizing Aircraft Reliability and Maintenance: Adopting Six Sigma in aviation involves meticulous analysis of aircraft parts and maintenance procedures. Airlines can systematically identify and mitigate defects by leveraging the DMAIC (Define, Measure, Analyze, Improve, Control) framework. This increases aircraft reliability and enhances passenger safety (George, 2003).

3. Enhancing Turnaround Times and Customer Service: Six Sigma methodologies target operational aspects such as turnaround times and customer service. By examining and refining these processes, airlines aim to minimize delays and ensure efficient, error-free customer interactions, contributing to overall passenger satisfaction (Antony, 2014).

Incorporating Six Sigma in aviation is not merely a strategy for quality and efficiency but a comprehensive methodology that addresses the complexities of aircraft operations and customer service. Through disciplined application of the DMAIC framework, Six Sigma empowers airlines to achieve excellence in all aspects of their operations. This approach involves detailed, data-driven analysis to identify and mitigate defects, ensuring the highest reliability and safety standards. Additionally, Six Sigma optimizes turnaround times, enhancing operational efficiency and customer satisfaction by reducing delays and providing reliable service. This continuous improvement ethos aligns with aviation's dynamic environment, helping airlines maintain a competitive edge through operational excellence and superior customer service.

However, Six Sigma is a crucial methodology in aviation, ensuring high safety, reliability, and efficiency standards. By applying rigorous data-driven analysis and continuous improvement practices, airlines can optimize operations, enhance customer satisfaction, and maintain a competitive edge in the industry.

Business Process Reengineering

Business Process Reengineering (BPR) is a transformative approach that significantly enhances productivity, reduces cycle times, and improves quality in aviation. By revamping ticketing systems, streamlining maintenance routines, and overhauling crew scheduling, airlines can eliminate redundancies and respond more agilely to market demands. BPR is crucial for boosting productivity, shortening cycle times, and improving service quality across all flight phases: pre-flight, in-flight, and post-flight.

The aviation industry benefits significantly from BPR by meeting high operational reliability and efficiency demands. Airlines can optimize operations by reassessing and restructuring business processes, which enhances customer experiences, ensures aircraft safety, and utilizes personnel more effectively. Integrating advanced technological platforms streamlines booking, payment, and customer service functions while efficient maintenance operations reduce delays and enhance safety (Davenport, 1993).

Revamping crew scheduling through BPR introduces flexibility, improves resource allocation, and generates cost savings. BPR's adoption underscores a commitment to continuous improvement and adaptability, leading to significant productivity gains and superior quality experiences for customers. BPR

is a strategic initiative that streamlines airline operations and substantially improves its ability to meet and exceed evolving market and customer expectations. (Hammer & Champy, 1993; Davenport, 1993). This focus is crucial for maintaining competitive advantage and operational excellence in a highly demanding industry;

1. The significance of Quality comes first.

Pre-flight service quality: Pre-flight service quality plays a vital role in shaping passengers' overall flight experience and perception of an airline. David Mc. A. Baker's research highlights airlines' significant operational challenges, such as managing costs, adapting to demand fluctuations, and delivering high-quality services (David Mc A, B. 2013). By comparing service quality and customer satisfaction between legacy and low-cost airlines, Baker's study, using data from the Department of Transportation's Air Travel Consumer Report, reveals that low-cost airlines often provide superior service. This highlights the importance of robust infrastructure, customer service, strategic market positioning, and operational efficiency in enhancing airline performance and passenger satisfaction.

The pre-flight phase is crucial for ensuring customer happiness and loyalty. Reliable flight status updates, efficient luggage handling, and seamless check-in processes are fundamental components that positively influence passengers' experiences and engagement with the airline's personnel. Investing in pre-flight services is a cost-effective strategy for boosting customer retention, as there is a significant correlation between pre-flight satisfaction and loyalty. Evaluating pre-flight services helps airlines identify areas for improvement and capitalize on service strengths (Rat et al., 2022).

Ultimately, the perceived quality of pre-flight services significantly impacts customer loyalty, setting a distinct tone for the entire travel experience. Effective pre-flight services contribute to operational efficiency, help airlines distinguish themselves from competitors, attract customers, and increase revenue through enhanced service fees.

In-Flight Service Quality: In-flight service quality plays a crucial role in shaping passenger satisfaction, loyalty, and appreciation in the competitive aviation industry. Elements such as seat comfort, food diversity, cabin crew professionalism, and entertainment options are pivotal. Meeting and surpassing these aspects create memorable experiences that resonate with passengers. Air travel has evolved from luxury to necessity, leading to more discerning and vocal customers sharing their experiences digitally. This underscores the importance of in-flight service quality as a critical differentiator in the market.

The relationship between in-flight service quality and passenger satisfaction is complex, necessitating a deep understanding of customer needs. The SERVQUAL model, highlighting service quality dimensions like tangibles, reliability, responsiveness, assurance, and empathy, is instrumental in enhancing passenger satisfaction (Kamkiew, 2021). Studies on Thai Airways International Flights confirm that managing these factors effectively can significantly boost service quality.

Rat, Metz, and Toadere's (2022) research illustrates in-flight service as a multifaceted construct involving crew behavior, onboard comfort, and responsiveness to passenger needs. This fosters trust and satisfaction, which in turn drives passenger loyalty. Similarly, Dursun and Durmaz (2022) found that aircraft interiors and catering significantly impact passengers' perceptions of service quality.

Ultimately, In-flight service quality exceeds meeting basic needs; it entails delivering a comprehensive and exceptional experience. Airlines committed to high-quality service can build lasting trust and preference among passengers, establishing a global competitive advantage.

Post-flight Service Quality: Post-flight service quality is crucial in shaping passenger satisfaction and building loyalty toward an airline. The interactions and services encountered after disembarking significantly impact passengers' overall perception of the airline, influencing their decision to fly with the same company again or to recommend it to others—comprehensive service quality, encompassing pre-flight, in-flight, and post-flight interactions, fosters passenger loyalty. Airlines must maintain high service standards throughout travel, including efficient baggage retrieval, smooth airport navigation, adequate staff support, and robust passenger feedback channels (Raju & Priya, 2019).

The COVID-19 pandemic has underscored the importance of post-flight service quality, with cleanliness and comfort becoming paramount. Airports and airlines that consistently meet and communicate these heightened standards are more likely to enhance and sustain passenger satisfaction over the long term (Walia et al., 2021).

Maintaining high service standards in post-flight operations is integral to ensuring overall passenger satisfaction and loyalty. This critical review emphasizes that post-flight quality directly impacts passengers' final impressions and future travel decisions, underscoring the need for a holistic approach to quality management. These insights naturally transition to the next section, which will explore strategies for integrating quality control measures across all phases of air travel, ensuring a seamless and satisfying passenger experience.

2. Elements of Quality in each aspect

Pre-Flight Services: Pre-flight services are pivotal in shaping passenger experiences and perceptions of airline quality. This aspect, known as Pre-flight Ground Service Quality (PFGSQ), includes all ground-handling activities before boarding, such as airport lounges, staff interactions, baggage policies, online booking, and check-in processes (Rat et al., 2022). These services are critical as they represent passengers' initial direct interaction with the airline, setting the stage for the entire travel experience. Significant components impacting pre-flight service quality include the efficiency and ability of staff to handle emergencies, manage baggage issues, and ensure swift boarding processes. These factors can improve customer satisfaction and streamline the airport experience (Bahreini et al., 2013). Integrating advanced technologies in airport infrastructure, like self-service kiosks and mobile check-in options, can significantly reduce wait times and improve pre-boarding operations, enhancing passenger perceptions of the airline.

Airlines employ several strategies to elevate pre-flight service experiences, essential for fostering customer loyalty and enhancing service perceptions. (Sakdaar, 2020):

1)   **Proactive Communication:** Keeping passengers informed about flight schedules, delays, and essential travel information helps manage expectations effectively.

2)   **Efficient Check-In Procedures:** Implementing self-service kiosks and mobile check-in options speeds up the process and showcases the airline's commitment to modern, efficient service.

3)   **Personalization of Services:** Tailoring services to individual needs, such as special meal requests and personalized in-flight entertainment, significantly enhances passenger satisfaction.

4) **Loyalty Programs:** Comprehensive loyalty programs providing quick points redemption and exclusive bonuses reinforce the airline's value proposition to frequent flyers.

5) **Luxurious Lounges:** High-quality lounges offer comfort and exclusivity, especially in premium travel classes, enhancing the pre-flight experience.

6) **Simplified Security Procedures:** Streamlining security checks minimizes hassle while ensuring safety, improving the pre-flight experience.

7) **Feedback Mechanisms:** Actively seeking and responding to passenger feedback allows airlines to address service shortfalls and meet customer expectations more effectively

8) **Frontline Workers Training:** Comprehensive training for frontline staff ensures professional, courteous, and helpful interactions, setting a positive tone from the outset.

9) **Managing Expectations for Delays:** Transparent communication during delays and compensations like lounge access or vouchers help maintain satisfaction and loyalty.

10) **Sustainable Practices:** Demonstrating commitment to environmental sustainability can also resonate with eco-conscious passengers, enhancing the airline's reputation.

Overall, the quality of pre-flight services is crucial for ensuring operational efficiency and building lasting customer relationships based on trust and satisfaction. By focusing on these elements, airlines can significantly enhance passenger experiences, contributing to higher loyalty and better competitive positioning in the airline industry.

In-flight Service: In the fiercely competitive aviation industry, the quality of in-flight services is crucial in determining passenger satisfaction. Airlines utilize the SERVQUAL model, known for its comprehensive assessment of service quality across dimensions like empathy and reliability, to meet and exceed customers' varied expectations. These expectations are influenced by diverse factors such as cultural backgrounds, travel purposes, and seating choices (Dike et al., 2024).

Dike et al. (2024) highlight the significant impact of customer service management, delay management, and baggage handling on passenger satisfaction. These aspects critically influence the overall travel experience, with any deficiencies likely leading to significant passenger grievances. Additionally, customer service quality must be considered. The passengers' satisfaction levels significantly depend on the reliability and responsiveness of the services provided. According to Duarte & Herlina (2020), in-flight service quality encompasses various amenities offered during the flight, such as the courtesy of the crew, comfort of seating, quality of meals, entertainment options, and the language skills of the crew, which crucially affect passenger satisfaction during these decisive moments in the service delivery (Munusamy et al., 2011).

To boost in-flight service quality and thus enhance passenger satisfaction and competitive positioning, airlines implement several strategic measures:

1) **Professionalism and Training**: Investing in comprehensive training programs ensures cabin crew members are well-equipped with the necessary skills and etiquette to deliver exceptional service and effectively handle in-flight emergencies. The professionalism of the cabin staff significantly affects passengers' perceptions of service quality.

2) **Personalized Service**: Airlines increasingly focus on customized services to cater to each passenger's needs and preferences. This includes recognizing frequent flyers, tailoring services according

to passenger status, and ensuring a friendly and accommodating interaction from the cabin staff, significantly enhancing the travel experience.

3)   **Food and Beverage Quality**: Food and beverage quality, variety, and presentation are fundamental elements of in-flight service. Airlines collaborate with renowned chefs to offer gourmet meals that highlight local flavors and cater to special dietary needs.

4)   **In-flight Entertainment and Connectivity**: A broad range of entertainment choices and reliable connectivity are essential for ensuring passenger satisfaction. Advanced in-flight entertainment systems offer diverse media options and robust Wi-Fi, keeping travelers engaged and productive.

5)   **Cabin Ambiance and Comfort**: Investments in modern cabin designs that feature premium seating, adjustable lighting, and noise-canceling technology significantly boost passenger comfort. Comfortable seating is critical, especially in business classes, as it influences passengers' perceptions of value for money and their overall travel experience.

6)   **Safety Measures**: Passenger safety is paramount, and perceptions of safety greatly influence loyalty and satisfaction. Airlines adhere to stringent safety protocols, regularly enhanced by programs like the IATA Operational Safety Audit (IOSA) (IATA,2022). Maintaining impeccable aircraft conditions and clear communication about safety procedures bolsters passengers' sense of security.

7)   **Feedback Mechanisms**: Effective feedback systems allow airlines to quickly gather and address passenger concerns, improving service quality based on customer insights.

8)   **Sustainable Practices**: Demonstrating commitment to environmental sustainability appeals to passengers who are increasingly mindful of their ecological impact.

Superior in-flight services are crucial for maintaining passenger loyalty and satisfaction. Airlines focusing on meticulous service details, prompt responses, and continuous improvements will likely keep a competitive edge as global passenger preferences evolve, emphasizing service quality, safety, and innovation.

Post-flight service quality enhances passenger satisfaction and loyalty toward an airline. Efficient baggage claim, smooth terminal navigation, accessible ground transportation, and responsive customer service significantly shape the end of the travel experience.

1)   **Baggage Claim Efficiency**: Efficient baggage handling is crucial for leaving a positive final impression. Timely luggage processing can significantly boost passenger satisfaction and foster brand loyalty. Airlines strategically use loyalty programs to enhance post-flight services, offering perks like priority baggage handling and exclusive lounge access (Vilkaite-Vaitone & Papsiene, 2016).

2)   **Customer Service**: The availability and responsiveness of customer service after landing are vital for post-flight satisfaction. Effective teams that promptly address passengers' inquiries or concerns contribute positively to the airline's image.

3)   **Cleanliness and Comfort of Airport Facilities**: The condition of the airport's facilities, including restrooms, waiting areas, and lounges, directly impacts the quality of the post-flight experience. Maintaining clean and comfortable facilities helps ensure a pleasant transition from the plane to the passenger's final destination.

4) Ground Transportation Access: Easy access to reliable ground transportation options at the airport is essential for a seamless end to the journey. Effective signage and assistance in navigating these options can significantly enhance the overall post-flight experience.

5) Loyalty Programs: Loyalty programs are critical to post-flight service quality and significantly benefit frequent flyers. These programs reward loyalty with membership tiers, provide more excellent perks, and emphasize the airline's commitment to its regular passengers.

Investing in high-quality post-flight services is crucial for airlines aiming to secure passenger loyalty and maintain a competitive edge.

Airlines' commitment to improving post-flight service quality is vital for maintaining high service standards and enhancing the overall passenger experience. Effective baggage handling and strategic loyalty programs boost customer loyalty and distinguish airlines in the competitive market. Airlines must consistently refine these services to meet evolving passenger needs and ensure that post-flight quality aligns with the exceptional standards experienced during the flight.

3. Strategies of Quality

Strategies for Enhancing Pre-Flight Service Quality: By enhancing the pre-flight experience, airlines can significantly influence passenger satisfaction and loyalty. Implementing user-friendly digital solutions for check-in, booking, seat selection, and real-time updates on gate changes and flight status significantly improves the pre-flight experience. Personalized services boost client happiness and engagement by using consumer information to provide customized deals and trip suggestions. Effective customer service, offering quick and courteous support online and at the airport, promptly addresses passenger concerns, enhancing their overall experience (Etemad-Sajadi et al., 2016). Additionally, streamlined airport procedures, achieved through close collaboration with airport authorities to improve passenger flow and reduce wait times, further enhance the pre-flight experience. By focusing on these strategies, airlines can ensure passengers board their flights with a positive impression, ultimately influencing their overall satisfaction with the airline.

Strategies for In-flight Service Quality: Satisfaction is closely tied to the perceived service quality experienced by passengers during their flight. The SERVQUAL and AIRQUAL models are often referenced, highlighting dimensions such as tangibles, assurance, empathy, and overall customer experience as critical for satisfaction. Each touchpoint, from pre-flight to post-flight, is essential and can significantly impact the overall experience and influence customer trust and loyalty towards the airline brand. A focus on safety, satisfaction, and quality of service is crucial for airlines to maintain loyalty among their passengers. By continuously improving safety measures, understanding and managing in-flight behaviors such as alcohol consumption, and delivering superior service quality, airlines can ensure positive, secure, and In-flight entertainment options, seat comfort, cabin crew, and rewarding travel experience for their customers.

Strategies for Post-flight Service Quality

Post-flight service quality, the concluding phase of the flight service sequence following passenger disembarkation, encompasses aspects like proficient baggage handling and efficient utilization of Frequent Flyer Programs (FFPs). These components are critical in solidifying customer contentment and fostering allegiance to the airline (Namukasa, 2013). Given the significance of post-flight interactions

in building customer satisfaction and loyalty, it is advised that airlines consistently enhance the caliber of their pre-flight, in-flight, and post-flight offerings. The goal of such enhancements should transcend beyond single-encounter satisfaction to establish enduring connections with passengers (James et al., 2023).

The superior quality of the post-flight services greatly influences passenger happiness and loyalty, making it an essential part of the travel experience. Vital loyalty programs, efficient baggage handling, and immaculate airport amenities significantly impact whether or not a traveler decides to use the same airline again. Improving post-flight services is essential to maintaining competitiveness and guaranteeing high levels of customer satisfaction as the airline industry changes. Airlines can gain a competitive edge and foster greater customer loyalty by improving these services, such as putting in place efficient feedback systems, ensuring luggage is delivered on time, and upholding high standards of communication and service after the flight.

4. Total Quality in Aviation (TQM)

Total Quality Management (TQM) in the airline industry is a comprehensive strategy aimed at continuous improvement across all levels of an organization. It thoroughly examines every segment, from ground operations to in-flight services, ensuring that high quality permeates throughout. Central to TQM focuses on key areas such as safety, timeliness, and passenger satisfaction, encouraging continuous enhancements through feedback integration and performance analytics.

TQM is beneficial and essential in aviation, mainly due to the inherent risks associated with air travel. It emphasizes a systematic approach to maintaining safety, operational accuracy, and relentless adherence to high standards. TQM principles help airlines enhance operational processes, gather and act on customer feedback, and improve travel experience. This results in a culture where ongoing improvements are standard, driven by data, and reflective of passenger needs.

Furthermore, TQM promotes employee engagement by valuing frontline staff feedback, which is crucial for identifying improvements and solving issues. Airlines employ TQM to meet and exceed passenger expectations, fostering a commitment to service excellence and customer loyalty. This approach ensures that airlines remain competitive by continually advancing their service quality and operational effectiveness.

Challenges in Maintaining Quality Control

Maintaining consistent quality control in the airline industry involves overcoming significant challenges, from operational issues to technological advancements, financial constraints, and regulatory compliance. Each aspect significantly impacts the delivery of high-quality services across various customer touchpoints, from check-in to post-flight interactions, as follows;

1. Operational disruptions: Weather conditions, air traffic control delays, and technical malfunctions often lead to flight delays, cancellations, and missed connections. These disruptions adversely affect passenger experiences and challenge airlines' ability to maintain service quality and effective communication, posing a significant hurdle in day-to-day operations.

2. Technology Advancements: The rapid pace of technological advancement necessitates continual investment to improve operational efficiency and enhance passenger experiences. This

includes integrating state-of-the-art technologies such as online booking systems, self-service check-in kiosks, in-flight entertainment, and real-time luggage tracking. The challenge lies in combining these technologies seamlessly into existing systems without service disruption, requiring significant investment and training (Pengurusan et al., 2022)

3. Balancing cost and quality: Striking a balance between price and quality is another critical challenge. Competitive pricing is essential for attracting and retaining customers but should not compromise service quality. Airlines often face budget constraints that may tempt them to cut costs in ways that could degrade service quality. Airlines must implement cost-saving strategies wisely to prevent undermining the quality of service that customers expect (Cao & Goh, 2004).

4. Staff training and retention: The quality of airline services largely depends on the professionalism and skills of its staff. Effective recruitment, training, and retention of skilled personnel are essential for maintaining quality control. The high turnover rate in the industry complicates these efforts, as the constant need to train new employees can affect service consistency and strain resources.

5. Regulatory compliance: Airlines also navigate a complex landscape of international and domestic regulations. Ensuring compliance while maintaining high service standards requires a thorough understanding of regulatory requirements and implementing compliant procedures.

6. Best practices for quality control: Airlines employ various best practices to ensure quality control, leveraging technology, soliciting passenger feedback, and providing continuous staff training. The SERVQUAL and AIRQUAL frameworks highlight the importance of the entire customer journey in building passenger loyalty, emphasizing that high service quality directly impacts passenger satisfaction and loyalty (Namukasa, 2013).

7. ISO 9000 Certifications: ISO 9000 certifications are pivotal in reinforcing an airline's commitment to quality. These certifications validate procedures against global standards, reflecting a dedication to surpassing customer expectations and maintaining a competitive edge. Successfully integrating ISO 9000 standards demonstrates an airline's capacity for high-level service quality and positions it as a leader in industry-wide enhancement and innovation (ICAO, 2018; Poksinska, 2016).

However, achieving and maintaining quality control in the airline industry requires resilience, innovation, and a customer-centric approach. Addressing these challenges effectively ensures exceptional service that meets, if not exceeds, passenger expectations.

Conclusion

In conclusion, the airline industry's quality control strategies are fundamental to maintaining competitiveness and ensuring customer satisfaction. Integrating Strategic Quality Management (SQM), Six Sigma methodologies, Business Process Reengineering (BPR), and Total Quality Management (TQM) provides a comprehensive approach to addressing quality across pre-flight, in-flight, and post-flight services. SQM aligns TQM principles with strategic goals, fostering continuous improvement and market adaptability. This alignment enhances brand identity and customer loyalty through personalized services and advanced cabin designs, securing a competitive edge. Six Sigma's data-driven approach eliminates defects, reduces variability, and optimizes processes, improving operational efficiency and passenger satisfaction through the DMAIC framework. BPR significantly boosts productivity and operational agility by

overhauling critical systems and processes, enhancing customer experiences and reliability. TQM emphasizes a culture of continuous improvement, focusing on safety, timeliness, and passenger satisfaction, driven by data and customer feedback.

Effective quality control in pre-flight services ensures smooth check-in processes and personalized offerings, establishing a positive initial experience. High-quality in-flight services are pivotal for shaping passenger satisfaction, while efficient post-flight services leave a lasting positive impression. These integrated quality control strategies result in sustained competitive advantage, strong customer loyalty, and overall operational excellence in the airline industry. The author can summarize the quality control model as follows.
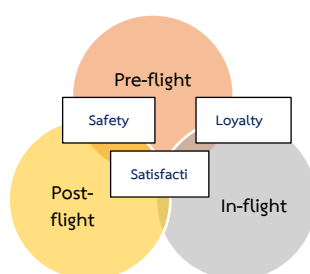

Figure 1 Quality in the Airline Industry

Quality in the Airline Industry Picture 1, as represented by the ongoing pursuit of excellence in punctuality and cleanliness, directly impacts passenger loyalty. The importance of quality control across these three phases is visually represented in the accompanying image, highlighting the ongoing pursuit of excellence in punctuality, cleanliness, and service. This holistic approach underscores the delicate balance between delivering high-quality in-flight service and ensuring safety—a balance airlines strive to maintain. To ensure continuous innovation and adherence to high service standards, the airline industry must sustain its commitment to quality at every journey step—before, during, and after a flight. This unwavering dedication is the essence of creating a loyal customer base and ensuring passenger safety, solidifying the aviation industry's competitive edge and market position.

Airlines face significant challenges, including operational disruptions, technological advancements, balancing cost and quality, staff training and retention, and regulatory compliance. Addressing these challenges requires a resilient, innovative, and customer-centric approach. Operational disruptions like weather and technical malfunctions impact passenger experiences. Integrating new technologies and balancing cost with quality without compromising service standards are critical challenges. Effective recruitment, training, and retention of skilled personnel, along with navigating regulatory landscapes, are essential for maintaining high service standards.

This table effectively summarizes each quality control strategy's theoretical concepts and practical applications, linking them to pre-flight, in-flight, and post-flight services. This visual representation helps readers understand how each strategy contributes to overall service quality and operational efficiency in the airline industry.

Table 1 Quality Control Strategies in the Airline Industry.

Quality Control Strategy	Key Concepts	Pre-Flight Applications	In-Flight Applications	Post-Flight Applications
Strategic Quality Management (SQM)	Integration of TQM with strategic goals, continuous improvement, and market adaptability	Efficient check-in processes, proactive communication, personalized service offerings	Advanced cabin designs, personalized in-flight services	Efficient baggage handling, responsive customer service
Six Sigma	Data-driven approach, DMAIC framework, eliminating defects, reducing variability	Streamlining check-in and boarding processes	Optimizing in-flight services (e.g., food quality, seat comfort)	Reducing turnaround times, improving baggage handling
Business Process Reengineering (BPR)	Overhauling processes, boosting productivity, increasing operational agility	Redesigning ticketing and maintenance routines	Enhancing crew scheduling, improving in-flight processes	Streamlining baggage claim processes, enhancing ground services
Total Quality Management (TQM)	Continuous improvement, data and customer feedback-driven, fostering a culture of excellence	Implementing feedback mechanisms, ensuring safety and timeliness	Ensuring cabin crew professionalism, enhancing in-flight entertainment	Continuous improvement of customer service, integrating passenger feedback

This table above outlines the critical quality control strategies employed in the airline industry, emphasizing their theoretical underpinnings and practical applications across different phases of the customer journey. **Strategic Quality Management (SQM)** integrates **Total Quality Management (TQM)** principles with strategic goals, focusing on continuous improvement and market adaptability. **Six Sigma** employs a data-driven approach to eliminate defects and optimize processes, enhancing efficiency and safety. **Business Process Reengineering (BPR)** aims to overhaul and streamline operations, significantly boosting productivity and agility. Lastly, **Total Quality Management (TQM)** fosters a culture of excellence through continuous improvement and customer feedback. Together, these strategies ensure high-quality service, operational efficiency, and customer satisfaction, ultimately securing a competitive edge in the dynamic aviation market.

Airlines must leverage technology, solicit passenger feedback, and provide continuous staff training to maintain quality control. SERVQUAL and AIRQUAL frameworks highlight the importance of service quality, while ISO 9000 certifications demonstrate commitment to global standards. Integrating SQM, Six Sigma, BPR, and TQM enhances service quality and operational efficiency. Addressing challenges and refining practices ensures airlines exceed passenger expectations, securing a competitive edge. This dedication to quality fosters safety, satisfaction, and loyalty, ensuring airlines lead in the

evolving aviation industry and the future, we should explore the comparative effectiveness of quality control strategies across different regions, the role of emerging technologies in enhancing service quality, and the impact of employee engagement on sustaining high service standards in the airline industry.

Reference

Antony, J. (2014). Readiness factors for the Lean Six Sigma journey in the higher education sector. *International Journal of Productivity and Performance Management*, *63*(2), 257-264.

Bahreini, K., SeyedAliAkbar, S., Azad, N., & Izadi, M. (2013). Measuring service quality and a comparative analysis in airline industry. *Management Science Letters*, *3*(1), 275-280.

Cao, C. L., & Goh, T. N. (2004). Balancing the quality and price of service case study. In *2004 IEEE International Engineering Management Conference (IEEE Cat. No. 04CH37574)* (pp. 1100–1104). New Jersey: IEEE.

Davenport, T. H. (1993). *Process innovation: reengineering work through information technology*. Massachusetts: Harvard Business Press.

David Mc A, B. (2013). Service quality and customer satisfaction in the airline industry: A comparison between legacy airlines and low-cost airlines. *American journal of tourism research*, *2*(1), 67-77.

Dike, S. E., Davis, Z., Abrahams, A., Anjomshoae, A., & Ractham, P. (2024). Evaluation of passengers' expectations and satisfaction in the airline industry: an empirical performance analysis of online reviews. *Benchmarking: An International Journal*, *31*(2), 611-639.

Duarte, K., & Herlina, S. (2020). Analisis Pengaruh Service Quality (Pre-Flight, In-Flight, dan Post-Flight) terhadap Kepuasan Konsumen Lion Air. *Equilibrium Jurnal Bisnis & Akuntansi*, *14*(2), 63-75.

Dursun, M. E., & Durmaz, V. (2009). Measuring the Pre-flight, In-flight, and Post-flight Service Quality of Airlines: A Research at Domestic Flights. In *the proceedings of the 5th International Strategic Management Conference* (p.361). Stellenbosch: Stellenbosch university.

Etemad-Sajadi, R., Way, S. A., & Bohrer, L. (2016). Airline passenger loyalty: The distinct effects of airline passenger perceived pre-flight and in-flight service quality. *Cornell Hospitality Quarterly*, *57*(2), 219-225.

George, M. L., & George, M. (2003). *Lean six sigma for service*. New York: McGraw-Hill.

Hammer, M., & Champy, J. (1994). *Reengineering the corporation: A manifesto for business revolution*. New York: Harper Collins.

IATA. (2022). IATA Releases 2021 Airline Safety Performance. International Air Transport Association. Retrieved 2 September 2023. from www.iata.org.

ICAO. (2013). *Passenger air traffic surpasses pre-pandemic levels*. International Civil Aviation Organization. Retrieved 2 September 2023. from https://www.icao.int/Newsroom/Pages/Passenger-air-traffic-surpasses-pre-pandemic-levels.aspx.

_____. (2018). Quality management systems—Fundamentals and vocabulary (ISO 9000:2015). Retrieved 2 September 2023. from https://www.iso.org/standard/45481.html.

James, E. E., Inyang, B. I., Akene, D. O., Odinka, P. C., & Akabomita, C. M. (2023). Airline service quality and passengers' loyalty in the Nigerian civil aviation sector. *Research Journal of Hospitality and Tourism Management*, *2*(1), 18-37.

Kamkiew, W. (2021). *Factors Influencing Service Quality of Thai Airways International Flights*. (Master's Thesis, National Institute of Development Administration).

Kaplan, R. S., & Norton, D. P. (2001). Transforming the balanced scorecard from performance measurement to strategic management: Part 1. *Accounting horizons*, *15*(1), 87-104.

Namukasa, J. (2013). The influence of airline service quality on passenger satisfaction and loyalty: The case of Uganda airline industry. *The TQM journal*, *25*(5), 520-532.

O'Connell, J. F., & Williams, G. (2005). Passengers' perceptions of low cost airlines and full service carriers: A case study involving Ryanair, Aer Lingus, Air Asia and Malaysia Airlines. *Journal of air transport management*, *11*(4), 259-272.

Pengurusan, J. F., Dhabi, A., & Dhabi, Z. C. A. (2022). Impact Of Airline Service Quality On Passenger Satisfaction And Loyalty: Moderating Influence Of Price Sensitivity And Quality Seekers. *Transformations in Business & Economics*, *21*(3), 57.

Poksinska, B. (2010). The current state of Lean implementation in health care: literature review. *Quality management in healthcare*, *19*(4), 319-329.

Pyzdek, T., & Keller, P. A. (2014). *Six Sigma Handbook, (ENHANCED EBOOK)*. McGraw Hill Professional.

Raju, J. K., & Priya, N. R. (2019). Air traveler satisfaction: An analysis of pre-flight, in-flight and post flight service quality. *ZENITH International Journal of Multidisciplinary Research*, *9*(7), 50-59.

Rat, C. L., Metz, M., & Toadere, C. (2022). The Role of Service Quality in Ensuring Customer Satisfaction in the Airline Industry. *Ovidius University Annals, Economic Sciences Series*, 22(1), 708-715.

Sakdaar, P., & Chaiwongkeat, C. (2020). Measuring Customer Loyalty for Airline Business. *Journal of Management Sciences, Surat Thani Rajabhat University*, *7*(1), 1-24.

Shaw, S. (2007). Airline Marketing and Management. London: Ashgate Publishing.

Vilkaite-Vaitone, N., & Papsiene, P. (2016). Influence of customer loyalty program on organizational performance: A case of airline industry. *Engineering economics*, *27*(1), 109-116.

Walia, S., Sharma, D., & Mathur, A. (2021). The impact of service quality on passenger satisfaction and loyalty in the Indian aviation industry. *International Journal of Hospitality and Tourism Systems*, *14*(2), 136-143.