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Operational Efficiency, Service Quality, and Firm Performance: A Strategic Orientation Perspective

Ali Imron [1], Muhamad Agung Dharmajaya [2,*]

[1] Faculty of Creative Design and Digital Business, Institut Teknologi dan Sains Nahdlatul Ulama Pekalongan, Pekalongan, Indonesia; imron.alialta@gmail.com

[2] Faculty of Economics and Business, Universitas Mathla'ul Anwar, Pandeglang, Indonesia; agungdharma@unmabanten.ac.id

* Correspondence Author: agungdharma@unmabanten.ac.id

Abstract

This study investigates the interaction between operational efficiency (OE) and service quality (SQ) in shaping firm profitability, while considering the moderating role of strategic orientation (SO), specifically focused and non-focused strategies. Drawing on the perspectives of competitive priorities and contingency theory, this research proposes that the effectiveness of balancing efficiency and quality depends on a firm's strategic positioning. Using panel data from the U.S. airline industry, the study applies econometric techniques and a series of robustness tests, including alternative model specifications, to ensure the validity and reliability of the findings. The results indicate that different dimensions of operational efficiency interact with service quality in distinct ways when influencing profitability. Although the interaction effects between operational efficiency and service quality are generally negative and consistent with theoretical expectations, they are not statistically significant, suggesting the presence of contextual factors that may shape these relationships. Furthermore, strategic orientation is found to play a significant moderating role in the relationship between operational efficiency, service quality, and profitability. In particular, strategic orientation strengthens the interaction between labor productivity and service quality, implying that firms can achieve superior performance when efficiency and quality initiatives are aligned with their strategic priorities. This study contributes to the operations and strategic management literature by reconciling inconsistent findings regarding the efficiency–quality–performance nexus and demonstrating the importance of strategic orientation as a contingency factor. The findings provide a more comprehensive understanding of how firms can balance operational efficiency and service quality to enhance profitability under different strategic contexts.

Keywords: Operational Efficiency; Service Quality; Strategic Orientation; Profitability; Airline Industry.

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1. Introduction

Operational efficiency (OE) and service quality (SQ) represent two fundamental dimensions of organizational performance that are particularly important in service industries. Firms are increasingly required to achieve high levels of efficiency while simultaneously delivering superior service experiences to customers, as both dimensions contribute to profitability and long-term competitive advantage (Silvestro & Lustrato, 2015; Ren et al., 2018; Mariani & Borghi, 2024). In highly competitive environments, organizations can no longer rely solely on cost leadership or service excellence; instead, they must effectively manage both priorities to sustain market competitiveness (Van Reenen, 2011; Kurokawa & Matsubayashi, 2017). For example, major airlines such as United Airlines and Delta Air Lines have introduced basic economy fares to attract price-sensitive customers while competing against low-cost carriers. Similarly, hospitality companies including Marriott and Hilton offer diverse service portfolios that range from budget accommodations to luxury properties, allowing them to address multiple customer segments simultaneously (Wang & Chung, 2015). Despite these strategic efforts, balancing OE and SQ remains a persistent managerial challenge, particularly as technological developments continue to transform service delivery systems and customer expectations (Dai et al., 2024; Guo et al., 2025).

The relationship between OE and SQ is often characterized by competing priorities. Enhancing operational efficiency may involve standardization, automation, and cost reduction initiatives that potentially limit service customization and customer interaction. Conversely, efforts to improve service quality frequently require additional resources, employee involvement, and operational flexibility, which may reduce efficiency levels. The bankruptcy of Spirit Airlines in 2024 provides an example of the risks associated with prioritizing efficiency while neglecting service quality, highlighting the complexity of balancing these objectives (Isidore & Dmitracova, 2024). Similar challenges are evident in healthcare organizations, where improving quality of care while controlling operational costs remains a major concern (Søgaard & Enemark, 2017). Nevertheless, advances in digital technologies, including artificial intelligence, machine learning, and big data analytics, offer new opportunities for organizations to improve both efficiency and service quality simultaneously (Dai et al., 2024; Guo et al., 2025; Hariguna & Ruangkanjanases, 2024; Yao et al., 2025). These developments suggest the need to revisit the relationship between OE and SQ and examine their combined influence on organizational profitability.

From a theoretical perspective, contingency theory suggests that organizational effectiveness depends on the alignment between managerial practices and contextual conditions (Luthans, 1976). Accordingly, the interaction between OE and SQ and its impact on firm performance may vary across organizational contexts. One contextual factor that may influence this relationship is strategic orientation (SO), which reflects the strategic direction guiding a firm's resource allocation and competitive behavior. Although previous studies have extensively investigated the influence of strategic orientation on organizational performance, particularly in relation to focused and non-focused competitive strategies (Deutscher et al., 2016; Parast & Oke, 2022; Zhu & Westphal, 2021), limited attention has been given to its role in shaping the relationship between OE and SQ. Given the resource-intensive nature of maintaining both efficiency and service quality, strategic orientation may determine how organizations prioritize investments and manage trade-offs between these objectives. Understanding this moderating role is therefore essential for explaining variations in profitability across firms.

Despite substantial research on operational efficiency, service quality, and organizational performance, two important gaps remain. First, empirical findings

regarding the relationship between OE and SQ remain inconsistent, with some studies suggesting trade-offs while others indicate potential complementarities. Consequently, further investigation is required to clarify whether these dimensions jointly contribute to profitability or undermine one another. Second, the moderating role of strategic orientation in influencing the OE–SQ relationship has received limited empirical attention, particularly in service-intensive industries where efficiency and quality are simultaneously critical.

To address these gaps, this study investigates two research questions. First, how does the interaction between operational efficiency and service quality influence firm profitability? Second, does strategic orientation moderate the relationship between operational efficiency, service quality, and profitability? To answer these questions, this study uses longitudinal data from the U.S. airline industry, an industry characterized by persistent tensions between operational efficiency and service quality (Cento, 2009; Sun et al., 2024). The analysis distinguishes between focused airlines, such as Southwest Airlines and Alaska Airlines, and non-focused airlines, such as American Airlines and United Airlines, enabling a deeper examination of the moderating role of strategic orientation. Although the airline industry provides the empirical context, the findings may also offer insights for other service sectors, including healthcare, banking, retail, and hospitality, where organizations face similar challenges in balancing efficiency and quality (Berta et al., 2010; Roets et al., 2018; Roth & Jackson, 1995; Talluri et al., 2013).

This study contributes to the literature in two important ways. First, it provides updated empirical evidence regarding the interaction between operational efficiency and service quality and their combined effect on profitability. Second, it extends contingency theory by demonstrating how strategic orientation influences the effectiveness of operational practices and shapes the relationship between efficiency, quality, and organizational performance. By highlighting the importance of strategic alignment, this study offers theoretical insights into competitive priorities while providing practical guidance for managers seeking to achieve profitability in increasingly dynamic and technology-driven service environments.

2. Materials and Methods

Operational efficiency (OE) and service quality (SQ) are widely recognized as two critical dimensions of organizational performance in service industries. Existing studies generally approach the relationship between these dimensions from two perspectives. The first perspective, grounded in the theory of competitive priorities, examines whether OE and SQ are inherently conflicting or mutually reinforcing objectives (Roth & Jackson, 1995; Peng et al., 2011). The second perspective focuses on the implications of the OE–SQ relationship for organizational outcomes such as profitability and customer satisfaction (Hung et al., 2015; Pourmohammad-Zia et al., 2021). While the former emphasizes theoretical explanations of efficiency–quality interactions, the latter concentrates on their practical consequences for firm performance. This study follows the second perspective by examining how the interaction between OE and SQ influences profitability and how strategic orientation shapes this relationship.

The relationship between OE and SQ remains one of the most debated topics in operations and service management. Several studies suggest that firms face unavoidable trade-offs when attempting to improve both dimensions simultaneously. According to this perspective, improvements in service quality often require additional investments in labor, customization, and customer interaction, which may reduce efficiency. Conversely, initiatives aimed at increasing efficiency frequently rely on standardization, automation, and cost reduction, potentially diminishing service quality. Roth and Jackson (1995) reported a negative relationship between productivity and service quality in the banking industry. Similarly, Lapré and Scudder (2004) found that airlines operating near their performance frontiers experienced stronger trade-offs among operational capabilities.

Berta et al. (2010) observed that achieving both high efficiency and superior quality of care remains highly challenging in healthcare organizations. Roets et al. (2018) further demonstrated that excessive efficiency pressures may increase operational risks and reduce service reliability in transportation systems.

Additional evidence supporting the trade-off perspective can be found in studies of service automation. Sampson and Froehle (2006) reported that greater automation may reduce customer satisfaction by limiting personalized interactions. Xia and Zhang (2010) found that retailers obtained limited benefits from early online channel adoption despite expected efficiency gains. More recently, Ferraro et al. (2024) argued that automation can reduce direct customer engagement, thereby negatively affecting customer experience. Because customers often participate directly in service delivery processes, variability in customer needs and expectations makes it difficult for organizations to simultaneously maximize efficiency and quality (Frei, 2003). Collectively, these studies suggest that improvements in operational efficiency may occur at the expense of service quality.

Conversely, another stream of research argues that OE and SQ can be complementary objectives. This perspective suggests that organizations can simultaneously improve both dimensions through process integration, technological innovation, and effective management systems. For example, healthcare organizations such as the Cleveland Clinic and Mayo Clinic have successfully enhanced efficiency while maintaining exceptional service quality through investments in information technology, process standardization, and accountability mechanisms (Raghupathi & Tan, 2008; Shortell & McCurdy, 2009). Likewise, Talluri et al. (2013) reported that service organizations demonstrating superior operating efficiency frequently achieved higher levels of service quality. These findings indicate that firms may be capable of achieving efficiency and quality simultaneously when supported by appropriate organizational capabilities and managerial practices.

Table 1. Summary of Previous Studies on Operational Efficiency and Service Quality

Study	Method and Sample	Theoretical Perspective	Main Findings
Roth & Jackson (1995)	Structural Equation Modeling; 135 retail bankers	Absorptive Capacity Theory	Total factor productivity and service quality are negatively associated.
Athanassopoulos (1997)	Data Envelopment Analysis (DEA); 68 commercial bank branches in Greece	Not specified	Product range and service reliability negatively affect the number of accounts serviced by branches.
Johnston & Jones (2004)	Conceptual study	Theory of Swift and Even Flow	The relationship between operational efficiency and customer productivity/satisfaction is neither consistently

Study	Method and Sample	Theoretical Perspective	Main Findings
			positive nor negative.
Lapré & Scudder (2004)	Performance improvement path analysis and multivariate analysis; 10 largest U.S. airlines	Theory of Performance Frontiers	High-performing airlines follow the sand cone model when operating far from asset frontiers but face trade-offs near those frontiers.
Berta et al. (2010)	Multiple case study; directors of Ontario long-term care homes	Not specified	Simultaneously achieving high efficiency and high quality of care is extremely challenging.
Rosenzweig & Easton (2010)	Meta-analysis of 64 studies	Theory of Performance Frontiers	Manufacturing firms generally do not experience significant trade-offs among quality, delivery, flexibility, and cost, although results vary across studies.
Nand et al. (2013)	ANOVA using longitudinal data from the Australian airline industry	Theory of Performance Frontiers	Firms accumulate capabilities when the gap between operating and asset frontiers is large but face trade-offs when operating close to asset frontiers.
Talluri et al. (2013)	DEA and ANOVA; service-driving agencies	Service Quality Theory	Service organizations with superior operational efficiency also tend to achieve higher service quality.
Roets et al. (2018)	DEA; Belgian railway traffic control centers	Not specified	High efficiency under fluctuating workloads increases susceptibility to

Study	Method and Sample	Theoretical Perspective	Main Findings
Pourmohammad-Zia et al. (2021)	Game-theoretic model, numerical experiments, and case study	Game Theory	human error, highlighting the efficiency–safety trade-off. Vendor-managed inventory and cost-sharing contracts improve supply chain performance by balancing efficiency and retailer incentives.

The inconsistent findings reported in prior studies indicate that the relationship between OE and SQ remains inconclusive. Such contradictions suggest that contextual factors may influence how organizations balance these priorities. One particularly important factor is strategic orientation (SO), which guides organizational decision-making, resource allocation, and competitive positioning.

Strategic orientation refers to an organization's long-term commitment to specific strategic priorities that shape its competitive behavior and operational decisions (Hakala, 2011). In service industries, SO determines how firms allocate resources among efficiency initiatives, service quality improvements, innovation activities, and customer relationship management. Previous research identifies customer orientation and operational excellence as two dominant dimensions of strategic orientation that directly correspond to service quality and operational efficiency, respectively (Grawe et al., 2009; Yao et al., 2025). Consequently, SO provides a useful framework for understanding how firms manage the relationship between efficiency and quality.

The airline industry offers a particularly suitable setting for examining strategic orientation because airlines typically adopt either focused or non-focused business strategies (Parast et al., 2015; Parast & Oke, 2022). Focused airlines, such as Southwest Airlines and Spirit Airlines, generally emphasize operational excellence, cost efficiency, and simplified service offerings. These carriers prioritize standardized operations and low operating costs to maintain competitive pricing. In contrast, non-focused airlines, including Delta Air Lines, United Airlines, and American Airlines, pursue broader strategies by offering multiple service classes, loyalty programs, premium amenities, and extensive route networks. Such firms emphasize customer experience and service differentiation while maintaining operational effectiveness.

The importance of strategic orientation can be further explained through contingency theory, which argues that organizational effectiveness depends on the alignment between managerial practices and contextual conditions (Donaldson, 2001; McAdam et al., 2019). According to contingency theory, there is no universally superior management approach. Instead, organizational outcomes depend on how effectively managerial practices fit organizational strategies and environmental circumstances. Strategic orientation may therefore influence whether firms can successfully balance operational efficiency and service quality or whether they must prioritize one objective over the other.

Profitability represents a key indicator of organizational success and sustainability. Operational efficiency contributes to profitability by reducing waste, improving resource utilization, and lowering operating costs (Oral & Yolalan, 1990). Service quality contributes to profitability by increasing customer satisfaction, customer retention,

loyalty, and positive word-of-mouth, which collectively enhance revenue generation (Yee et al., 2010; Donthu et al., 2021; Li et al., 2023). However, because investments in efficiency and quality often compete for organizational resources, attempts to improve both dimensions simultaneously may create tensions that negatively affect financial outcomes. Excessive emphasis on efficiency may reduce customer satisfaction, whereas excessive emphasis on service quality may increase operating costs and reduce profitability. Based on the theory of competitive priorities (Hayes & Wheelwright, 1984; Boyer & Lewis, 2002), the following hypothesis is proposed:

H1: The interaction between operational efficiency and service quality negatively affects profitability.

Although operational efficiency and service quality may generate trade-offs, contingency theory suggests that strategic orientation can influence the magnitude and direction of this relationship. Focused firms that emphasize either cost efficiency or service differentiation may experience stronger conflicts between efficiency and quality because of limited flexibility in resource allocation. In contrast, non-focused firms may be better positioned to integrate efficiency and quality initiatives through diversified capabilities, advanced technologies, and broader organizational resources (Grawe et al., 2009; Zhu & Westphal, 2021). Therefore, strategic orientation is expected to moderate the interaction between operational efficiency and service quality in influencing profitability.

H2: Strategic orientation positively moderates the relationship between operational efficiency and service quality in influencing profitability.

This study utilizes secondary data obtained from the United States Department of Transportation's Bureau of Transportation Statistics (BTS) database (www.bts.gov). The analysis covers the period from 2003 to 2019 and includes both focused airlines (e.g., Southwest Airlines and Alaska Airlines) and non-focused airlines (e.g., United Airlines and Delta Airlines). The final dataset consists of 121 observations for focused airlines and 72 observations for non-focused airlines. Annual observations were employed to reduce the influence of seasonality and short-term fluctuations, such as holidays and extreme weather conditions, following the recommendations of Lapré and Scudder (2004).

The airline industry was selected for three primary reasons. First, it represents a service-intensive sector in which operational efficiency and service quality are critical determinants of competitiveness and profitability. Second, the industry provides longitudinal operational and financial data that enable the examination of efficiency–quality interactions over time. Third, airlines can be clearly classified according to their strategic orientation, allowing for an effective comparison between focused and non-focused business models.

Operational efficiency (OE) was measured using two complementary indicators. The first indicator, labor productivity, was calculated as the ratio of annual passenger enplanements to the number of employees. This measure reflects the effectiveness with which airlines utilize their human resources and has been widely recognized as an important productivity indicator in service industries (Datta et al., 2005; Chiu & Huang, 2011). The second indicator, capacity productivity, was measured as the ratio of Revenue Passenger Miles (RPM) to Available Seat Miles (ASM), commonly known as the load factor. This measure captures how efficiently airlines utilize their available seating capacity.

Service quality (SQ) was measured using on-time performance (OTP), defined as the percentage of flights arriving within 15 minutes of their scheduled arrival time. OTP is one of the most widely accepted indicators of service quality in the airline industry because of its direct impact on customer satisfaction and service perceptions (Prince & Simon, 2009; Parast et al., 2015).

Profitability was measured as the ratio of operating profit to operating revenue, consistent with previous airline industry studies (Tsikriktsis, 2007; Parast et al., 2015; Parast & Oke, 2022). Several control variables were also included. Firm size was measured by the total number of employees (Chen et al., 2023; Csiki et al., 2023). Average flight time was incorporated to control for differences in route distance and operational complexity across airlines. The variable was calculated by dividing total annual flight time by the total number of flights. In addition, merger activity was controlled using a dummy variable indicating whether a merger occurred during the observation period (Parast & Oke, 2022).

Strategic orientation (SO) was operationalized as a dichotomous variable, where focused airlines were coded as 0 and non-focused airlines as 1. This classification follows the framework proposed by Parast et al. (2015) and Parast and Oke (2022). Non-focused airlines typically offer multiple service classes, operate diverse aircraft fleets, and serve a broad range of customer segments through hub-and-spoke networks. In contrast, focused airlines generally offer limited service options, operate standardized fleets, and primarily target price-sensitive customers through point-to-point networks.

To provide an overview of the sample characteristics, descriptive statistics and correlation analyses were conducted separately for non-focused and focused airlines. Tables 2 and 3 present the mean values, standard deviations, and correlation coefficients of the study variables.

Table 2. Descriptive Statistics and Correlation Matrix – Non-Focused Airlines

Variables	Firm Size	Average Flight Time	Labor Productivity	Capacity Productivity	Service Quality	Profitability
Firm Size	1					
Average Flight Time	0.513**	1				
Labor Productivity	-0.226*	-0.511**	1			
Capacity Productivity	0.404**	0.410**	0.223*	1		
Service Quality	0.168	-0.183	0.388**	0.207	1	
Profitability	0.413**	0.164	0.423**	0.756**	0.423**	1
Mean	**64,795**	**131.67**	**1,257.90**	**82.62**	**78.97**	**0.0324**
SD	**23,212**	**18.15**	**270.74**	**4.19**	**4.17**	**0.0732**

Notes: *p < 0.05; p < 0.10

The descriptive statistics indicate notable differences between the two groups of airlines. Non-focused airlines exhibit substantially larger organizational size, averaging 64,795 employees, compared with 13,073 employees for focused airlines. They also operate longer average flight times (131.67 minutes versus 101.89 minutes). Conversely, focused airlines demonstrate significantly higher labor productivity, averaging 2,520.39 compared with 1,257.90 for non-focused airlines. Non-focused airlines show slightly higher capacity productivity, while focused airlines report marginally better service quality and profitability.

Table 3. **Descriptive Statistics and Correlation Matrix – Focused Airlines**

Variables	Firm Size	Average Flight Time	Labor Productivity	Capacity Productivity	Service Quality	Profitability
Firm Size	1					
Average Flight Time	0.083	1				
Labor Productivity	0.017	-0.366**	1			
Capacity Productivity	-0.139	0.440**	0.086	1		
Service Quality	-0.065	-0.118	-0.232**	0.247**	1	
Profitability	0.280**	0.327**	-0.098	0.267**	0.254**	1
Mean	**13,073**	**101.89**	**2,520.39**	**81.33**	**79.80**	**0.0663**
SD	**12,999**	**33.71**	**806.81**	**4.69**	**5.87**	**0.0822**

The correlation analysis provides preliminary insights into the relationships among the variables. For non-focused airlines, profitability is positively associated with firm size, labor productivity, capacity productivity, and service quality, with capacity productivity exhibiting the strongest correlation. Among focused airlines, profitability is positively correlated with firm size, average flight time, capacity productivity, and service quality, whereas labor productivity does not display a statistically significant relationship. These findings suggest that the determinants of profitability vary according to strategic orientation and justify further examination through multivariate regression analysis.

3. Results

3.1 Econometric Specification and Estimation Strategy

To investigate the relationships among operational efficiency (OE), service quality (SQ), strategic orientation (SO), and profitability, a series of panel regression models were estimated using longitudinal airline data. Following previous studies, a group-level fixed-effects approach was employed by assuming that unobserved airline-specific heterogeneity is similar within strategic orientation groups (Parast et al., 2015; Parast & Oke, 2022). This approach allows the inclusion of strategic orientation as a group effect while avoiding perfect multicollinearity between airline-specific and strategic orientation indicators.

The empirical model is specified as follows:

$$Profitability_{\{it\}} = \beta_0 + \beta_1 Size_{\{it\}} + \beta_2 Merger_{\{it\}} + \beta_3 FlightTime_{\{it\}} + \beta_4 SO_i + \beta_5 X_{\{it\}} + \sum_{\{s=2004\}_s^{\{2019\}\delta}} Y_{\{s,t\}} + u_{\{it\}} \quad (1)$$

where *Profitabilityit* represents the profitability measure of airline *i* in year *t*; *Sizeit* denotes firm size; *Mergerit* captures merger activity; *FlightTimeit* represents average flight time; *SOi* denotes the time-invariant strategic orientation variable; *Xit* includes the

measures of operational efficiency and service quality; Ys,t represents year dummy variables (2004–2019, with 2003 omitted as the reference year); and *uit* is the idiosyncratic error term.

The Interaction Between Operational Efficiency and Service Quality

Hypothesis 1 proposes that the interaction between operational efficiency and service quality negatively affects profitability. Model 1 tests this relationship by examining the interaction between labor productivity and service quality. The coefficient of the interaction term is negative, which is consistent with the proposed hypothesis. However, the relationship is not statistically significant ($B = -8.93E{-}7$; $\beta = -0.786$; $p > 0.10$). Although the direction of the coefficient suggests a potential trade-off between operational efficiency and service quality, the lack of statistical significance indicates that the negative interaction cannot be confirmed empirically.

These findings imply that the relationship between efficiency and quality may be influenced by additional organizational or contextual factors that are not directly captured in the baseline model. Consequently, while the results align with theoretical expectations regarding the existence of efficiency–quality trade-offs, they provide only limited empirical support for Hypothesis 1.

Table 4. Fixed-Effects Regression Results

Variables	Model 1	Model 2
Year fixed effects	Yes	Yes
Intercept	-0.770** (0.270)	-0.669** (0.323)
Firm Size	0.022** (0.008)	0.023** (0.008)
Strategic Orientation (SO)	-0.059** (0.017)	-0.026** (0.225)
Merger	-0.022 (0.016)	-0.026 (0.016)
Flight Time	0.001** (0.004)	0.001** (0.0003)
Labor Productivity	8.62E-5 (1.0E-4)	5.157E-5 (0.0001)
Service Quality (SQ)	0.006** (0.003)	0.005 (0.004)
SQ × SO	–	-0.002 (0.003)
Labor Productivity × SQ	-8.93E-7 (1.7E-6)	-5.001E-7 (1.60E-6)
Labor Productivity × SO	–	4.042E-6 (3.64E-5)
SO × Labor Productivity × SQ	–	1.275E-6** (5.54E-7)
Variance Components		
Regression	0.549	0.587
Residual	0.545	0.507
Model Fit		
Adjusted R^2	0.428	0.458

The Moderating Effect of Strategic Orientation

Hypothesis 2 examines whether strategic orientation moderates the interaction between operational efficiency and service quality in influencing profitability. Model 2 introduces a three-way interaction among strategic orientation, labor productivity, and service quality.

The results show that the three-way interaction term is positive and statistically significant ($B = 1.275E{-}6$; $\beta = 0.813$; $p < 0.05$). This finding suggests that strategic orientation significantly influences how operational efficiency and service quality jointly affect profitability. More specifically, the positive coefficient indicates that the negative interaction between labor productivity and service quality becomes weaker among non-focused airlines.

The results further reveal that service quality strengthens the positive contribution of labor productivity to profitability among non-focused carriers. This pattern is consistent with the argument that full-service airlines benefit from simultaneously emphasizing operational excellence and customer-oriented service strategies. In contrast, focused airlines, whose business models primarily emphasize cost efficiency, do not experience the same synergistic benefits.

Overall, the findings support Hypothesis 2 and provide evidence that strategic orientation functions as an important contingency factor in shaping the profitability outcomes associated with operational efficiency and service quality. The results highlight the importance of aligning operational capabilities with strategic priorities to maximize organizational performance.

3.2 Robustness Tests

A series of robustness analyses were conducted to verify the stability and reliability of the findings.

Diagnostic Tests

First, potential autocorrelation was assessed using the Durbin–Watson (DW) test. The DW statistics ranged from 2.029 to 2.340, which falls within the recommended interval of 1.5–2.5 (King, 1983), indicating that autocorrelation is unlikely to bias the regression estimates. The normality of residuals was examined through histogram analysis and indicated an approximately normal distribution of errors (Singer & Willett, 2003). Potential outliers were evaluated using Cook's Distance, with a maximum value of 0.388, substantially below the commonly accepted threshold of 1.0 (Cohen et al., 2003). Furthermore, homoscedasticity was assessed by plotting residuals against predicted values. The absence of a systematic pattern confirmed that the assumption of constant variance was satisfied (Greene, 2012).

Alternative Productivity Measure

To evaluate the robustness of the findings across different operational efficiency indicators, an alternative productivity measure—capacity productivity—was incorporated into the analysis alongside labor productivity. Whereas labor productivity captures employee efficiency in transporting passengers, capacity productivity measures how effectively airlines utilize available seating capacity to generate revenue.

Model 2 evaluates the interaction between capacity productivity and service quality. Similar to the labor productivity model, the interaction coefficient is negative, consistent with the hypothesized direction ($B = -5.001E{-}7$; $\beta = -2.028$; $p > 0.10$). However, the relationship remains statistically insignificant. Although the magnitude of the effect differs from that observed for labor productivity, the results suggest that the relationship between productivity and service quality may vary depending on the specific productivity dimension considered.

Model 3 examines the three-way interaction among strategic orientation, labor productivity, and service quality, while Model 4 investigates the interaction among strategic orientation, capacity productivity, and service quality. In Model 4, the coefficient of the three-way interaction is positive ($B = 2.062E{-}5$; $\beta = 0.827$) but does not achieve statistical significance. Despite the lack of significance, the consistency in coefficient direction across the models provides support for a contingency perspective, suggesting that the effectiveness of productivity–quality alignment depends on both strategic orientation and the type of productivity measure employed.

Overall, labor productivity exhibits the strongest and most consistent relationship with profitability, particularly among non-focused airlines. These findings indicate that the benefits of simultaneously pursuing productivity and service quality are most evident when labor resources are effectively managed within an appropriate strategic framework.

Table 5. Robustness Results Using Alternative Productivity Measures

Variables	Model 1	Model 2	Model 3	Model 4
Year Fixed Effects	Yes	Yes	Yes	Yes
Intercept	-0.770** (0.270)	-2.339 (1.773)	-0.669** (0.323)	-0.566 (1.683)
Firm Size	0.022** (0.008)	0.021** (0.009)	0.023** (0.008)	0.024** (0.008)
Strategic Orientation (SO)	-0.059** (0.017)	-0.076** (0.018)	-0.026** (0.225)	-1.187** (0.227)
Merger	-0.022 (0.016)	-0.020 (0.016)	-0.026 (0.016)	-0.060** (0.017)
Flight Time	0.001** (0.004)	0.0003 (0.0002)	0.001** (0.0003)	0.0003 (0.002)
Labor Productivity	8.62E-5 (1.0E-4)	5.157E-5 (0.0001)	–	–
Capacity Productivity	–	0.022 (0.021)	–	0.003 (0.020)
Service Quality (SQ)	0.006** (0.003)	0.024 (0.022)	0.005 (0.004)	0.004 (0.021)
SQ × SO	–	–	-0.002 (0.003)	-4.16E-5 (0.001)
Labor Productivity × SQ	-8.93E-7 (1.7E-6)	–	-5.001E-7 (1.60E-6)	–
Labor Productivity × SO	–	–	4.042E-6 (3.64E-5)	–
Capacity Productivity × SQ	–	-0.0002 (0.0003)	–	–1.191E-5 (2.48E-4)
Capacity Productivity × SO	–	–	–	0.012** (0.004)
SO × Labor Productivity × SQ	–	–	1.275E-6** (5.54E-7)	–
SO × Capacity Productivity × SQ	–	–	–	2.062E-5 (2.67E-5)
Variance Components				
Regression	0.549	0.548	0.587	0.640
Residual	0.545	0.538	0.507	0.446
Model Fit				
Adjusted R^2	0.428	0.430	0.458	0.518

Alternative Model Specification

To account for airline-specific variations not fully captured by strategic orientation and other fixed effects, an alternative mixed-effects model was estimated by treating airlines as random effects (Parast et al., 2015; Parast & Oke, 2022). This specification captures differences in managerial practices, organizational structures, merger histories, and operational routines across airlines.

The mixed-effects model is expressed as follows:

$$\text{Profitability}_{it} = \beta 0 + \beta i X_{it} + u_i + \varepsilon_{it} \quad (2)$$

where *Profitabilityit* represents the profitability of airline *i* in year *t*; *β0* denotes the overall intercept; *βi* represents the fixed effect of each predictor; *Xit* refers to the explanatory variables included in the model; *ui* represents airline-specific random effects; and *εit* denotes the residual error term.

The mixed-effects results indicate a negative interaction between labor productivity and service quality ($\beta = -0.0003$; $p < 0.10$), while the interaction between capacity productivity and service quality remains statistically insignificant ($\beta = 0.0001$; $p > 0.10$). Furthermore, strategic orientation exhibits a positive moderating influence on both the labor productivity × service quality interaction ($\beta = 0.0005$; $p > 0.10$) and the capacity productivity × service quality interaction ($\beta = 0.001$; $p > 0.10$), although neither effect reaches conventional significance levels.

Comparing the fixed-effects and mixed-effects results yields two important insights. First, the three-way interaction among strategic orientation, labor productivity, and service quality is statistically significant in the fixed-effects model, whereas the mixed-effects model emphasizes the importance of the two-way interaction between labor productivity and service quality. This difference highlights the importance of accounting for airline-specific heterogeneity when examining operational and service performance relationships.

Second, the interaction between capacity productivity and service quality changes direction across the two model specifications. This finding suggests that airline-specific characteristics substantially influence how productivity and service quality interact. While individual airlines may experience varying relationships between these dimensions, productivity and service quality generally appear to complement one another across the broader industry when random effects are considered.

To further assess the importance of airline-level heterogeneity, intraclass correlation coefficients (ICC) were calculated and ranged from 0.50 to 0.75. These values indicate that a substantial proportion of profitability variation is attributable to differences between airlines. Consequently, airline-specific characteristics represent an important source of performance heterogeneity.

Taken together, the robustness analyses reinforce the primary findings of the study. Labor productivity consistently demonstrates the strongest synergy with service quality, while strategic orientation remains a critical contingency factor influencing the relationship between operational efficiency, service quality, and profitability. These findings provide additional support for contingency theory by suggesting that performance improvements are most likely when productivity and quality initiatives are aligned with a firm's strategic orientation and operational context.

4. Discussion

The relationship between operational efficiency (OE), service quality (SQ), and profitability remains a central issue in service operations management. Organizations continuously face the challenge of determining whether improvements in efficiency and quality can be achieved simultaneously or whether gains in one dimension inevitably come at the expense of the other. This challenge becomes even more complex when strategic orientation (SO) is considered as a contextual factor shaping organizational priorities and resource allocation. Building on contingency theory, this study contributes to the ongoing debate by examining multiple dimensions of OE and investigating how SO influences the interaction between OE and SQ in affecting profitability.

The findings indicate that different dimensions of OE produce varying interaction effects with SQ. Both labor productivity and capacity productivity exhibit negative interaction coefficients with SQ, suggesting the presence of potential trade-offs between efficiency and quality. Although these effects are not statistically significant, their direction is consistent with the theoretical expectation that simultaneous efforts to

maximize efficiency and service quality may create tensions that reduce profitability. This finding helps explain the inconsistent conclusions reported in prior studies, many of which have conceptualized efficiency using different dimensions and measurement approaches. By separating labor productivity and capacity productivity, the study demonstrates that the relationship between OE and SQ is multidimensional rather than uniform. Consequently, evaluations of operational performance should consider multiple dimensions of efficiency instead of relying on a single indicator.

Another important contribution concerns the moderating role of strategic orientation. The results reveal that the interaction between OE and SQ becomes more favorable among firms pursuing a non-focused strategic orientation. The significant positive three-way interaction suggests that organizations with broader strategic positioning are better able to reconcile the competing demands of efficiency and quality. These firms appear to possess greater flexibility in resource allocation, enabling them to simultaneously pursue operational excellence and customer satisfaction without experiencing severe profitability penalties. This finding supports contingency theory, which argues that the effectiveness of managerial practices depends on their alignment with organizational strategy and contextual conditions. In this regard, strategic orientation acts as a mechanism that shapes how firms manage competing operational priorities and convert them into superior performance outcomes.

The results also extend the competitive priorities literature by illustrating that the effects of OE and SQ on profitability cannot be fully understood in isolation. While both OE and SQ independently contribute positively to profitability, their simultaneous pursuit may generate tensions that weaken financial performance. Such tensions emerge because OE often emphasizes standardization, cost reduction, and process optimization, whereas SQ frequently requires flexibility, customization, and additional resource investments. Examples from various industries illustrate this challenge. Airlines pursuing aggressive cost-reduction strategies may experience lower service responsiveness, while highly customized service offerings may increase operational complexity and costs. Consequently, firms must carefully align operational practices with strategic objectives to avoid situations in which efficiency improvements undermine customer experience or service enhancements erode operational performance.

From a managerial perspective, the findings suggest that service organizations should recognize the complex interaction between OE and SQ rather than treating them as independent performance objectives. Managers should pay particular attention to labor productivity, as it appears to be the most influential efficiency dimension affecting the OE–SQ–profitability relationship. While capacity productivity remains important, excessive emphasis on capacity utilization may create operational pressures that negatively affect service quality and customer satisfaction. Therefore, managers should balance productivity improvements with quality initiatives to ensure sustainable profitability.

The results further indicate that firms with broader strategic orientations are more capable of competing simultaneously on efficiency and quality dimensions. Managers should therefore consider how strategic positioning influences the effectiveness of operational improvement programs. Organizations operating in highly competitive environments may benefit from adopting more flexible business models that enable them to respond to diverse customer needs while maintaining operational efficiency. Recent developments in the airline industry illustrate this trend, as several low-cost carriers have begun expanding their service offerings to compete more effectively with full-service airlines. Such strategic adjustments support the argument that broader strategic orientations can help firms address efficiency–quality trade-offs more successfully.

Despite these contributions, several limitations should be acknowledged. First, the study relies on objective measures of OE and SQ, which may not fully capture the complexity of these constructs. Although objective indicators reduce measurement bias,

they may overlook important dimensions such as customer perceptions, employee experiences, and service customization. Future research could develop more comprehensive multidimensional measures that integrate both objective and subjective indicators. Second, strategic orientation was operationalized using a dichotomous classification of focused and non-focused airlines. While this approach is consistent with prior studies, it may oversimplify the strategic diversity that exists within the airline industry. Many firms increasingly adopt hybrid business models that combine elements of both cost leadership and differentiation strategies. Future studies should therefore explore more nuanced measures of strategic orientation and strategic flexibility.

Furthermore, the airline industry represents a capital-intensive and highly regulated service sector. Although the findings may be applicable to industries with similar characteristics, such as transportation, hospitality, healthcare, and utilities, caution should be exercised when generalizing the results to manufacturing settings or other service industries. Future research should examine whether the observed relationships hold across different organizational contexts and competitive environments. Longitudinal and qualitative studies may also provide deeper insights into the mechanisms through which strategic orientation shapes the interaction between operational efficiency and service quality. Such investigations would contribute to a more comprehensive understanding of how organizations can simultaneously achieve efficiency, quality, and profitability in increasingly dynamic and technology-driven markets.

5. Conclusions

This study reexamines the enduring debate concerning the compatibility of operational efficiency (OE) and service quality (SQ), particularly in relation to their combined influence on firm profitability. The findings suggest that organizations do not necessarily face a strict choice between pursuing efficiency and delivering high-quality service. Rather, the relationship between OE and SQ is more complex and contingent upon both the way efficiency is conceptualized and measured and the strategic orientation adopted by the firm.

By distinguishing OE into labor productivity and capacity productivity, the study reveals that although both efficiency and service quality independently contribute positively to profitability, their simultaneous interaction may weaken financial performance. These results highlight the importance of adopting a multidimensional perspective on OE, indicating that the efficiency–quality trade-off varies across different dimensions of efficiency and organizational contexts. Furthermore, the findings demonstrate that strategic orientation serves as a critical contingency factor. Firms with a broader, non-focused strategic orientation are better positioned to balance efficiency and quality objectives, enabling them to achieve superior performance outcomes. From a managerial standpoint, these findings emphasize the importance of aligning operational efficiency and service quality initiatives with the firm's overall business model and strategic priorities to maximize profitability.

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