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The Moderating Role of Relationship Quality on Service Quality and Customer Loyalty in SME Third-Party Logistics Services

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Abstract

Purpose: This study examines how relationship quality moderates the relationship between service quality dimensions and customer loyalty in third-party logistics (3PL) services for small and medium enterprises (SMEs). **Research design, data and methodology:** A quantitative approach was employed using survey data from 308 SMEs in Thailand utilizing 3PL services. The SERVQUAL framework measured service quality across five dimensions: tangibles, reliability, responsiveness, assurance, and empathy. Relationship quality and customer loyalty were assessed using validated multi-item scales. Partial Least Squares Structural Equation Modeling (PLS-SEM) analyzed the direct and moderating effects. **Results:** Four service quality dimensions significantly influenced customer loyalty: reliability, responsiveness, assurance, and empathy, with empathy showing the strongest effect. Tangibles did not significantly impact loyalty. Critically, relationship quality significantly moderated the effects of reliability, responsiveness, assurance, and empathy on loyalty, demonstrating that strong relationships amplify service quality benefits. The model explained 65% of variance in customer loyalty. **Conclusions:** Service quality alone is insufficient for building loyalty in SME-3PL partnerships. Providers must integrate service excellence with relationship development strategies. The findings advance theoretical understanding of service quality-loyalty mechanisms in B2B logistics contexts and provide actionable insights for 3PL providers serving resource-constrained SMEs.

Keywords : Service Quality, Relationship Quality, Third-Party Logistics, Customer Loyalty, SMEs

JEL Classification Code : M31, L84, M21

1. Introduction

Small and medium enterprises (SMEs) face increasing pressure to optimize supply chain operations while maintaining cost efficiency and customer satisfaction. Third-party logistics (3PL) services provide critical advantages, including cost reduction, improved delivery times, and enhanced customer satisfaction (Qureshi, 2022). Unlike large corporations, SMEs rely on external providers to access specialized resources and expertise that would be cost-prohibitive to develop in-house (Darko & Vlachos, 2022). However, partnership success depends on service quality and relationship strength between 3PL providers and SME clients.

Despite the growing importance of 3PL for SMEs, understanding of how service quality dimensions influence customer loyalty remains limited. Most studies investigate service quality from quality management perspectives, with gaps in B2B relationship analysis focusing on 3PL providers (Gaudenzi et al., 2020). While SERVQUAL has been

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extensively studied, different logistics users have varying requirements, suggesting the service quality-loyalty relationship may be influenced by relational factors receiving insufficient attention (Meidutė-Kavaliauskienė et al., 2020).

The service quality-customer loyalty relationship in logistics is complex due to interconnected supply chain components that resist aggregate-level modeling (Carter et al., 2015). This suggests traditional direct-effect models may inadequately explain how service quality influences 3PL customer loyalty. Parasuraman et al. (1988) introduced the widely adopted SERVQUAL scale comprising five dimensions: tangibles, reliability, responsiveness, assurance, and empathy. The model has been extensively adapted for logistics services, with researchers recognizing industry-specific modification needs (Mentzer et al., 2001).

Relationship quality has emerged as critical for understanding B2B service relationships, particularly in logistics where long-term partnerships ensure operational success. Relationship quality is conceptualized as a multidimensional construct comprising satisfaction, trust, and commitment that may moderate the service quality-loyalty relationship (Darko & Vlachos, 2022; Rahman, 2006; Handfield & Bechtel, 2002).

Three gaps justify this research. First, few empirical studies address 3PL service quality in SME B2B relationships, where resource constraints create unique dynamics (Selviaridis & Spring, 2007). Second, while service quality's direct effects have been extensively studied, research examining moderating effects remains limited (Rita et al., 2019). Third, understanding conditions where service quality translates into genuine loyalty requires examining relational moderators (Ali et al., 2018).

This research investigates how relationship quality moderates the relationship between SERVQUAL-based service quality dimensions and customer loyalty in SME 3PL services. The primary research question is: How do relationship quality components moderate the service quality-customer loyalty relationship in SME 3PL services? This research advances understanding of service quality-loyalty relationships in logistics contexts, provides empirical evidence for relationship quality's moderating role, and offers actionable insights for 3PL providers.

2. Literature Review

2.1. Theoretical Foundation of Service Quality

Service quality has emerged as a critical determinant of business success across various industries, particularly in service sectors where intangible attributes dominate customer evaluations (Parasuraman et al., 1988; Zeithaml et al., 1990). The conceptualization of service quality has evolved significantly since the 1980s, with researchers developing various theoretical frameworks to understand and measure this complex construct.

The foundational work by Parasuraman, Zeithaml, and Berry (1985, 1988) established service quality as a multidimensional construct, initially proposing ten dimensions that were later refined to five core dimensions: tangibles, reliability, responsiveness, assurance, and empathy. Their seminal contribution, the SERVQUAL model, conceptualized service quality as the gap between customer expectations and perceptions of actual service performance (Parasuraman et al., 1988). The expectancy-disconfirmation paradigm became the dominant framework for understanding service quality for over a decade. The SERVQUAL model is built on the expectancy-disconfirmation paradigm, suggesting that service quality is understood as the extent to which consumers' pre-consumption expectations are confirmed or disconfirmed by their actual perceptions (Parasuraman et al., 1985). The framework defines service quality as the difference between customer expectations and perceptions, with tangibles referring to physical aspects, reliability encompassing dependable service performance, responsiveness involving willingness to help customers, assurance including employee knowledge and trustworthiness, and empathy representing individualized customer attention (Zeithaml et al., 1990).

2.2. SERVQUAL in Logistics and Third-Party Logistics

The application of SERVQUAL in logistics has required significant adaptation since Parasuraman et al. (1988) introduced the original framework. Mentzer et al. (2001) expanded SERVQUAL for logistics contexts, identifying nine dimensions including information quality, order accuracy, and timeliness, reflecting operational complexity. Bienstock et al. (1997) emphasized timeliness, availability, and condition of goods as critical indicators. While SERVQUAL's conceptual foundation remained relevant, dimensions required substantial modification to capture the operational nature of logistics services.

SERVQUAL application to 3PL revealed additional complexities due to strategic partnership arrangements. Jusufbašić and Stević (2023) note that quality is a key success factor in the market, and high quality and quality systems are critical for successful company performance. Their study demonstrates how SERVQUAL can be effectively applied to transport companies, measuring customer expectations and perceptions across all five dimensions: tangibles, reliability, responsiveness, assurance, and empathy.

Tangibles encompass physical infrastructure, equipment, technology platforms, and vehicle fleets. Setiono and Hidayat (2022) demonstrated that tangibles have a positive and significant effect on customer satisfaction, showing that better tangibles lead to higher satisfaction values. Reliability emerges as universally critical across logistics contexts, encompassing service dependability, documentation accuracy, and performance consistency. Rizkina et al. (2025) define reliability as the ability of service providers to provide timely, accurate, and satisfactory services, demonstrating a direct relationship between service reliability and customer loyalty mediated through satisfaction. Responsiveness represents prompt service delivery and assumes particular importance due to logistics' time-sensitive nature. Lin et al. (2023) found logistics service providers should prioritize timely and accurate delivery, with bottleneck analysis determining which predictors have the greatest impact on outcomes. Richey et al. (2022) note that responsiveness serves as a foundational perspective for logistics and supply chain management, embodying the supply chain network and orientation toward customer satisfaction. Assurance encompasses employee knowledge, courtesy, and trust-building abilities. Setiono and Hidayat (2022) identified assurance as part of the most important subscale affecting customer satisfaction and building trust. Empathy reflects understanding of individual customer needs and creates emotional connections. Bahadur et al. (2018) confirmed the positive indirect effect of employee empathy on customer loyalty and loyalty outcomes including positive word-of-mouth and repurchase intentions.

This study integrates classic SERVQUAL dimensions with logistics-specific quality indicators to create a more comprehensive measurement framework. Studies have attempted to combine five generic dimensions of SERVQUAL with emerging dimensions of service quality in the logistics industry to broaden the evaluation scale. This integration approach recognizes that while SERVQUAL provides a solid foundation, logistics services require additional dimensions to capture their unique characteristics.

2.3. Customer Loyalty in Service Contexts

Customer loyalty has been extensively studied across various service industries, with researchers recognizing it as a multidimensional construct encompassing both attitudinal and behavioral components (Oliver, 1999; Szymanski & Henard, 2001). The literature distinguishes between behavioral loyalty, which focuses on repeat purchase behavior, and attitudinal loyalty, which encompasses psychological commitment and emotional attachment to the service provider.

The relationship between service quality and customer loyalty has been a central theme in services marketing research. However, this relationship is not straightforward. A comprehensive meta-analysis found that "the customer satisfaction-loyalty main effect is indeed weak and that customer satisfaction, by itself, can hardly change customer loyalty in a significant way" (Szymanski & Henard, 2001). This finding has prompted researchers to investigate mediating and moderating factors that influence the service quality-loyalty relationship.

In logistics contexts, customer loyalty takes on particular significance due to the strategic nature of logistics partnerships and the high switching costs associated with changing providers. Research has shown that logistics service quality significantly impacts customer satisfaction and reuse intention, with satisfied customers being more likely to maintain long-term relationships with their providers (Hui et al., 2025; Lin et al., 2023).

The complexity of loyalty in B2B contexts, which characterizes most 3PL relationships, adds additional layers to the service quality-loyalty relationship. B2B loyalty is influenced by factors such as relationship duration, switching costs, and strategic importance of the service, making it distinct from B2C loyalty patterns (Chumpitaz Caceres & Paparoidamis, 2007).

2.4. Service Quality and Customer Loyalty

The relationship between service quality and customer loyalty is well-established in the literature. Zeithaml et al. (1996) proposed a conceptual model demonstrating that service quality influences loyalty through customer satisfaction and perceived value, with subsequent studies confirming strong direct relationships (Carrillat et al., 2009; Cronin & Taylor, 1992).

Recent research reinforces this relationship across diverse service contexts. Ahmed et al. (2021) showed service quality significantly impacts customer satisfaction and relationship quality in 3PL industries, while Rai et al. (2022) identified it as critical for creating customer value and loyalty in B2B logistics. Contemporary studies have expanded service quality to include digital dimensions, with tracking information quality, service efficiency, and flexibility as key drivers of loyalty (Lin et al., 2023).

Empirical evidence validates this relationship across logistics contexts. Yoganandan and Vasan (2024) found tangibles and responsiveness highly influenced perceived service quality in freight forwarding, with significant links between service quality, satisfaction, and loyalty. E-commerce logistics research confirms that timeliness, order accuracy, and handling positively affect satisfaction and loyalty (Rashid & Rasheed, 2024), with satisfaction mediating the service quality-loyalty relationship (Gupta et al., 2023).

In B2B contexts, Gaudenzi et al. (2020) demonstrate that different combinations of logistics service quality dimensions lead to high satisfaction and loyalty, with service quality playing crucial roles alongside trust and commitment (Haghkhah et al., 2020). Based on this extensive empirical evidence, the following hypotheses are proposed for each SERVQUAL dimension:

H1: Tangibles have a positive effect on customer loyalty.
H2: Reliability has a positive effect on customer loyalty.
H3: Responsiveness has a positive effect on customer loyalty.
H4: Assurance has a positive effect on customer loyalty.
H5: Empathy has a positive effect on customer loyalty.

2.5. Moderating Role of Relationship Quality

Relationship quality represents the overall strength and effectiveness of ongoing exchange relationships between 3PL providers and SME customers (Ahmed et al., 2021; Palmatier et al., 2006). This meta-construct captures the totality of relational experiences, encompassing customers' holistic assessments of how well relationships meet their expectations and objectives (Crosby et al., 1990; Athanasopoulou, 2009).

In SME-3PL contexts, relationship quality assumes particular importance due to SMEs' resource constraints and dependence on collaborative partnerships. Research shows that 3PL-client relationships evolve from transactional to collaborative when expectations are met, with relationship quality emphasizing reliability, trustworthiness, and operational integration supporting SME business objectives (Ahmed et al., 2021; Darko & Vlachos, 2022; Valashiya & Luke, 2023). Recent literature recognizes relationship quality as a critical moderating variable in service contexts, functioning as a contextual factor that alters how customers interpret service quality initiatives (Arthur et al., 2024). When relationship quality is high, customers interpret service improvements as genuine provider commitment, amplifying positive impacts on loyalty (Ahmed et al., 2021). This moderating effect is particularly pronounced in complex service environments where relationship quality creates interpretive frameworks influencing customer perceptions and evaluation standards (Samake et al., 2023; Thapit et al., 2022).

Empirical evidence consistently supports relationship quality's moderating role across B2B and SME environments. Studies demonstrate that relationship quality moderates service quality effectiveness in generating loyalty outcomes and creates boundary conditions determining when service quality translates into loyalty (Masitenyane et al., 2023; Rauyruen & Miller, 2007). In SME contexts specifically, relationship quality assumes heightened moderating importance due to resource constraints and personalized decision-making processes. SMEs rely more heavily on relationship-based assessments when evaluating service quality, making relationship quality a more salient moderating factor (Casidy & Nyadzayo, 2019; Thapit et al., 2022). The intricate, interdependent nature of these relationships creates multiple pathways through which relationship quality influences service quality perceptions. Given SMEs' distinct characteristics—including resource constraints, personalized decision-making, and higher relationship dependency—relationship quality may function differently as a moderator in SME-3PL contexts compared to large enterprise relationships. Therefore, the following hypotheses are proposed:

H6a-6e: Relationship quality moderates the relationship between each SERVQUAL dimension and customer loyalty, such that the positive effect is stronger when relationship quality is high.

3. Research Methods and Materials

3.1. Sample and Data Collection

This study employs a quantitative research approach within the 3PL service industry. This industry selection is appropriate because service organizations rely heavily on service quality to differentiate themselves and build customer loyalty, with the intangible nature of services making relationship quality particularly important for retention. The 3PL context provides suitable conditions for testing the SERVQUAL model, as all five service quality dimensions are relevant and observable, while customers typically engage in ongoing relationships with providers, making relationship quality meaningful and measurable.

The target population comprised SMEs currently utilizing 3PL services in Thailand. This geographic focus provides cultural and regulatory homogeneity while ensuring a manageable population. The sampling frame included SMEs across various industries (manufacturing, retail, e-commerce, distribution) that had used 3PL services for at least 12 months, ensuring sufficient experience to evaluate service quality and relationship quality meaningfully (Chumpitaz Caceres & Paparoidamis, 2007). SMEs were identified through industry association membership lists and 3PL provider client databases.

Questionnaires were emailed to 400 companies across Thailand, with key informants being chief executive officers, managers, or senior personnel. Data collection yielded 308 responses, representing a 77% response rate. This sample size exceeds established PLS-SEM guidelines of 100-200 respondents and is sufficient for robust statistical analysis

(Hair et al., 2020). The demographic profile is shown in Table 1.

Table 1: Demographic Profile of the Respondents

Characteristics		Frequency	Percent
Type of Company	Manufacturing	74	24.02
	Finished Products	92	29.87
	Retailers	117	37.99
	Other	25	8.12
Total		308	100.00
The firm's employee size	Less than 30	87	28.25
	31- 100	158	51.30
	More than 100	63	20.45
Total		308	100.00
Type of service	Warehousing	72	23.38
	Transportation	146	47.40
	Packaging and Materials handling	62	20.13
	Other	28	9.09
Total		308	100.00

3.2. Survey Instrument Development

A structured questionnaire was developed incorporating validated scales for all constructs. Service quality was measured using the 22-item SERVQUAL scale (Parasuraman et al., 1988) adapted for the 3PL context. Relationship quality employed a 6-item scale adapted from Casidy and Nyadzay (2019). Customer loyalty utilized an 8-item scale combining behavioral intentions and attitudinal loyalty measures adapted from Zeithaml et al. (1996) and Oliver (1999). All items used 7-point Likert scales ranging from "strongly disagree" (1) to "strongly agree" (7).

The questionnaire followed survey research best practices, incorporating clear instructions, logical flow, and consistent response formats. Pretesting involved expert review for content validity, followed by a pilot study with 50 participants. Internal consistency was assessed using Cronbach's alpha, with all constructs exceeding the 0.70 threshold, indicating acceptable reliability (Nunnally & Bernstein, 1994).

Potential common method bias was addressed through varied measurement anchors and respondent anonymity (Podsakoff et al., 2003). Harman's single-factor test showed the first factor explained 38% of total variance, below the 50% threshold, indicating no substantial common method bias.

The study utilized PLS-SEM 4.0 based on its suitability for exploratory research contexts, robust performance with smaller sample sizes, and ability to handle non-normal data distributions while effectively modeling complex multivariate relationships (Duarte & Amaro, 2018).

4. Results and Discussion

4.1. Measurement Model Assessment

The measurement model assessment evaluated the reliability and validity of all constructs. Reliability assessment revealed excellent internal consistency across all constructs, with Cronbach's alpha values ranging from 0.802 to 0.890, substantially exceeding the recommended threshold of 0.70. Composite reliability (CR) values ranged from 0.8276 to 0.9456, all surpassing the 0.70 threshold (Hair et al., 2010), confirming strong internal consistency.

Indicator reliability was satisfactory, with factor loadings for all items exceeding the acceptable threshold of 0.50 (Costello & Osborne, 2005), ranging from 0.674 to 0.877. Most indicators demonstrated strong loadings above 0.70, indicating that the latent constructs explain substantial variance in their respective indicators. All Variance Inflation Factor (VIF) values were below 5.0 (Hair et al., 2011), ranging from 1.321 to 2.570, indicating absence of multicollinearity concerns.

Convergent validity was established through Average Variance Extracted (AVE) analysis, with all constructs achieving AVE values above the required 0.50 threshold (Hair et al., 2010), ranging from 0.582 to 0.699. Reliability demonstrated the highest convergent validity (AVE = 0.693), followed by Responsiveness (AVE = 0.699) and Assurance (AVE = 0.694), while Empathy showed the lowest but still acceptable AVE value of 0.582. These results confirm that each construct captures more than half of the variance in its indicators, supporting convergent validity across all measured constructs as displayed in Table 2.

Discriminant validity was assessed using the heterotrait-monotrait (HTMT) ratio of correlations approach (Henseler et al., 2015). The findings displayed in Table 3 indicate that all constructs are distinct from one another, with values required to be less than 0.90 (Franke & Sarstedt, 2019). The highest HTMT value was 0.93 between Empathy and Relationship Quality, marginally above the threshold but acceptable given the theoretical relationship between these constructs. All other HTMT values are below 0.90, providing confidence in the discriminant validity of the constructs.

Table 2: Factor Loading, Cronbach's Alpha, VIF CR, and AVE

Items	Factor Loading	Cronbach's Alpha	VIF	CR	AVE
Tangibles (TAN)					
TAN1	0.762	0.824	2.214	0.831	0.656
TAN2	0.808		1.642		
TAN3	0.795		1.836		
TAN4	0.871		1.647		

Items	Factor Loading	Cronbach's Alpha	VIF	CR	AVE
Reliability (REL)					
REL1	0.844	0.890	2.188	0.903	0.693
REL2	0.827		2.275		
REL3	0.838		2.519		
REL4	0.797		1.974		
REL5	0.856		2.265		
Responsiveness (RES)					
RES1	0.807	0.860	2.144	0.887	0.699
RES2	0.877		2.570		
RES3	0.840		2.459		
RES4	0.820		1.599		
Assurance (ASS)					
ASS1	0.819	0.853	1.807	0.856	0.694
ASS2	0.842		2.135		
ASS3	0.813		1.801		
ASS4	0.858		2.104		
Empathy (EMP)					
EMP1	0.792	0.819	1.751	0.827	0.582
EMP2	0.818		1.894		
EMP3	0.800		1.764		
EMP4	0.719		1.575		
EMP5	0.674		1.329		
Relationship Quality (RQ)					
RQ1	0.858	0.830	2.057	0.832	0.662
RQ2	0.842		1.988		
RQ3	0.861		1.618		
RQ4	0.797		1.977		
RQ5	0.764		1.500		
RQ6	0.819		1.758		
Customer Loyalty (CL)					
CL1	0.820	0.802	1.768	0.804	0.629
CL2	0.834		1.949		
CL3	0.799		1.792		
CL4	0.715		1.321		

Table 3: Heterotrait-Monotrait (HTMT) Ratio Analysis

Constructs	TAN	REL	RES	ASS	EMP	RQ	CL
TAN							
REL	0.852						
RES	0.817	0.859					
ASS	0.578	0.734	0.801				
EMP	0.792	0.809	0.786	0.869			
RQ	0.814	0.844	0.876	0.771	0.930		
CL	0.441	0.388	0.511	0.572	0.526	0.538	

4.2. Structural Model and Hypothesis Testing

Model fit assessment showed acceptable results with SRMR = 0.071 (below 0.08 threshold) and NFI = 0.904. The model demonstrates strong explanatory power (R^2 = 65%) and good predictive relevance (Q^2 = 0.374) (Chin et al., 2008), providing a robust framework for understanding service quality-loyalty relationships in SME 3PL services.

Structural model analysis revealed mixed support for the proposed hypotheses. Four of five direct effect hypotheses were supported: reliability (β = 0.341, p < 0.001), responsiveness (β = 0.448, p < 0.004), assurance (β = 0.482, p < 0.026), and empathy (β = 0.434, p < 0.000) demonstrated significant positive effects on customer loyalty, supporting H2-H5. Tangibles showed no significant effect (β = 0.341, p > 0.215), failing to support H1.

Regarding moderating effects, four of five hypotheses were supported (H6b-H6e). Relationship quality significantly moderated the relationships between reliability (β = 0.358, p < 0.000), responsiveness (β = 0.449, p < 0.027), assurance (β = 0.456, p < 0.000), and empathy (β = 0.358, p < 0.000) with customer loyalty. The tangibles-loyalty moderation was not significant (H6a: β = 0.365, p > 0.136).

Beyond statistical significance, effect sizes (f^2) provide a complete picture of relationship magnitude. Following Cohen's (2008) guidelines, f^2 values of 0.02, 0.15, and 0.35 represent small, medium, and large effects, respectively. As shown in Table 4, the supported associations demonstrated moderate to substantial impact. Effect sizes varied from small to large, with empathy showing the largest effect (f^2 = 1.545) in both direct and moderated relationships, indicating its particularly strong influence on customer loyalty in the 3PL context for SMEs.

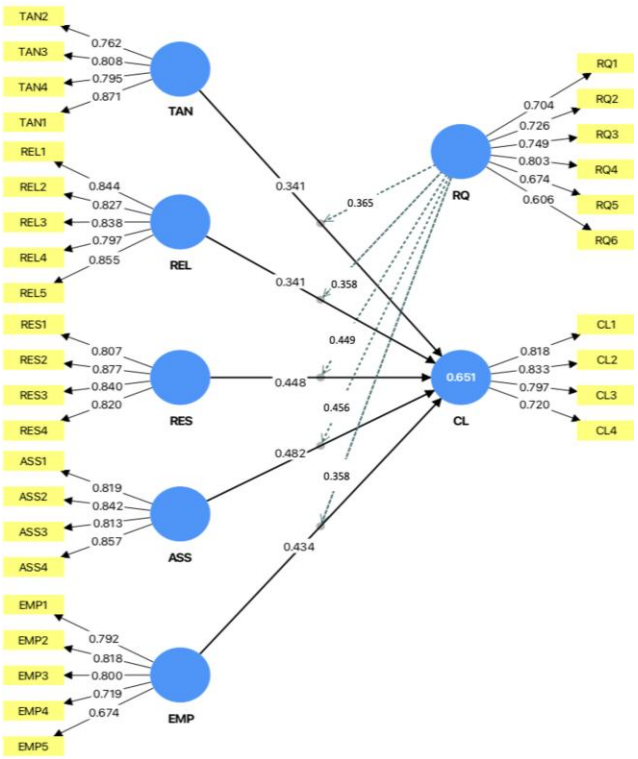

Figure 1: Structural Model

Table 4: Structural Model Results and Hypothesis Testing

Hypothesis	β	S.E.	p-value	f-square	Results
H1: TAN → CL	0.341	0.059	0.215	0.001 (small)	Not Supported
H2: REL → CL	0.341	0.057	0.001**	0.250 (medium)	Supported
H3: RES → CL	0.448	0.081	0.004**	0.158 (large)	Supported
H4: ASS → CL	0.482	0.074	0.026*	0.025 (medium)	Supported
H5: EMP → CL	0.434	0.101	0.000***	1.545 (large)	Supported
H6a: TAN x RQ → CL	0.365	0.076	0.136	0.016 (small)	Not Supported
H6b: REL x RQ → CL	0.358	0.102	0.000***	0.356 (large)	Supported
H6c: RES x RQ → CL	0.449	0.082	0.027*	0.459 (large)	Supported
H6d: ASS x RQ → CL	0.456	0.095	0.000***	0.124 (medium)	Supported
H6e: EMP x RQ → CL	0.358	0.064	0.000***	1.248 (large)	Supported

Note: statistical significance level *** p value<0.001, ** p value<0.01 and * p value<0.05

4.2.1. Comparative Analysis by Company Characteristics

To provide deeper insights into how service quality dimensions and relationship quality effects vary across different SME segments, a multi-group analysis was conducted. Respondents were segmented by company type. Table 5-7 presents the comparison of service quality effects across different company types, employee sizes, and service categories.

Table 5: Comparative Analysis by Company Types

Effects	Manufac-turing (n = 74)	Finished Products (n = 92)	Retailers (n = 117)	Other (n = 25)
	β			
TAN → CL	0.298	0.352	0.325	0.372
REL → CL	0.392**	0.378**	0.342**	0.367**
RES →CL	0.477**	0.415**	0.437**	0.428**
ASS → CL	0.421**	0.446**	0.498**	0.441**
EMP → CL	0.387**	0.425**	0.512***	0.403**
TAN × RQ → CL	0.342	0.374	0.381	0.359
REL × RQ → CL	0.425***	0.386**	0.375**	0.397**
RES × RQ →CL	0.461**	0.432**	0.444**	0.436**
ASS × RQ → CL	0.428***	0.452***	0.485***	0.438***
EMP × RQ → CL	0.342**	0.405***	0.468***	0.387**

Note: statistical significance level *** p value<0.001, ** p value<0.01, and * p value<0.05

The analysis revealed significant differences in service quality priorities across company types. Manufacturing SMEs placed greater emphasis on reliability (β = 0.392, p < 0.001) and responsiveness (β = 0.477, p < 0.001), while retailers prioritized empathy (β = 0.512, p < 0.000) and assurance (β = 0.498, p < 0.000). This reflects manufacturing companies' focus on operational efficiency versus retailers' emphasis on customer-facing attributes.

Table 6: Comparative Analysis by Company size

Effects	Less than 30 (n = 87)	31-100 (n = 158)	More than 100 (n = 117)
	β		
TAN → CL	0.332	0.348	0.335
REL → CL	0.375**	0.348**	0.329**
RES →CL	0.463**	0.452**	0.428**
ASS → CL	0.457**	0.488**	0.472**
EMP → CL	0.456***	0.535***	0.412**
TAN × RQ → CL	0.375	0.367	0.354
REL × RQ → CL	0.412***	0.367**	0.345**
RES × RQ →CL	0.457**	0.442**	0.426**
ASS × RQ → CL	0.442***	0.461***	0.437***
EMP × RQ → CL	0.418***	0.392***	0.347**

Note: statistical significance level *** p value<0.001, ** p value<0.01, and * p value<0.05

Company size also influenced service quality priorities, with smaller companies (less than 30 employees) demonstrating stronger moderation effects of relationship quality on reliability (β = 0.412, p < 0.000) compared to larger SMEs, suggesting that relationship strength becomes more critical when internal resources are more limited.

Table 7: Comparative Analysis by Service Type

Effects	Ware-housing (n = 72)	Transpor-tation (n = 146)	Packaging/ Materials (n = 62)	Other (n = 28)
	β			
TAN → CL	0.344	0.339	0.348	0.362
REL → CL	0.487***	0.371**	0.325**	0.342**
RES →CL	0.421**	0.526***	0.437**	0.428**
ASS → CL	0.463***	0.476***	0.442**	0.439**
EMP → CL	0.408**	0.462***	0.425**	0.417**
TAN × RQ → CL	0.357	0.362	0.374	0.363
REL × RQ → CL	0.408***	0.365**	0.347**	0.359**
RES × RQ →CL	0.428**	0.472***	0.439**	0.432**
ASS × RQ → CL	0.448***	0.461***	0.443***	0.437**
EMP × RQ → CL	0.382***	0.441***	0.397***	0.379**

Note: statistical significance level *** p value<0.001, ** p value<0.01, and * p value<0.05

Service type analysis indicated that transportation service users showed the strongest relationship between responsiveness and loyalty (β = 0.526, p < 0.000), while warehousing service users emphasized reliability (β = 0.487, p < 0.000), reflecting the time-sensitive nature of transportation services versus the precision requirements in warehousing operations.

Particularly notable were the varying patterns of

relationship quality moderation across segments. Relationship quality demonstrated the strongest moderating effect on empathy for retailers ($\beta = 0.468$, $p < 0.000$) and smaller companies, while its moderating effect on reliability was strongest for manufacturing companies ($\beta = 0.425$, $p < 0.000$). These findings suggest that relationship quality functions differently across business contexts, amplifying the service dimensions most critical to each segment's operational needs.

4.3. Moderating Effects Analysis

To provide a more nuanced understanding of the significant moderating effects, interaction plots were created by calculating conditional effects at different levels of relationship quality (mean ± one standard deviation). Figure 2 displays the interaction plots for each service quality dimension.

Reliability (REL × RQ → CL): The interaction plot demonstrates a moderate positive slope for both high and low relationship quality conditions, with the high relationship quality line showing a steeper incline. When relationship quality is high, improvements in reliability yield substantially greater increases in customer loyalty compared to low relationship quality conditions. The diverging lines indicate that reliable service delivery becomes increasingly valuable as the relationship strengthens, suggesting that SMEs place greater trust in consistent performance when they have strong relationships with their 3PL providers.

Responsiveness (RES × RQ → CL): This dimension exhibits one of the most pronounced interaction effects, with a particularly steep slope under high relationship quality conditions. The plot reveals that responsive service has a dramatically amplified impact on loyalty when relationship quality is strong, while showing modest effects under weak relationship conditions. This suggests that quick problem resolution and proactive communication are especially valued by SMEs who have developed strong partnerships with their 3PL providers.

Assurance (ASS × RQ → CL): The assurance dimension demonstrates a strong positive slope that becomes steeper under high relationship quality conditions. The interaction effect shows that when SMEs trust their 3PL provider's competence and reliability, additional demonstrations of assurance (through knowledgeable staff and confidence-inspiring behavior) translate into significant loyalty gains. Under low relationship quality conditions, assurance improvements show more limited impact on loyalty.

Empathy (EMP × RQ → CL): This dimension displays the most dramatic interaction effect, with an extremely steep slope under high relationship quality conditions and a relatively flat slope under low relationship quality conditions. The wide gap between the high and low relationship quality lines indicates that empathetic, individualized attention is particularly powerful for building loyalty when the underlying relationship is strong, but has minimal impact when the relationship foundation is weak.

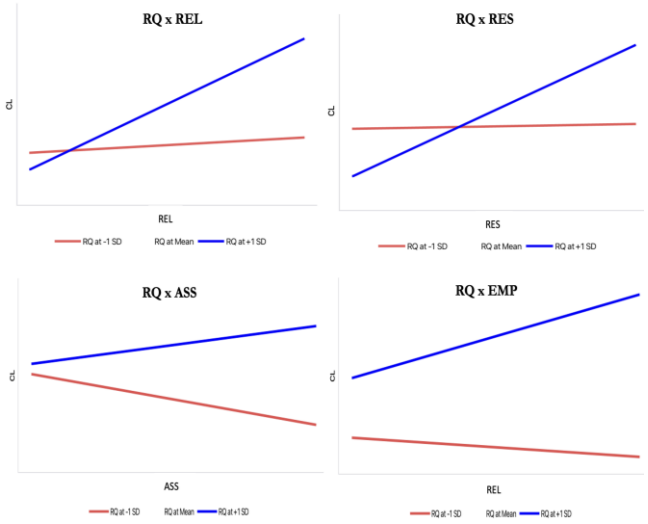

Figure 2: Interaction Effects of Relationship Quality

4.4. Discussion

This study examined how relationship quality moderates the relationship between service quality dimensions and customer loyalty in third-party logistics (3PL) services for small and medium enterprises (SMEs). The findings provide substantial evidence that relationship quality serves as a critical moderating factor, amplifying the effects of most service quality dimensions on customer loyalty.

Four of five SERVQUAL dimensions significantly affected customer loyalty: reliability ($\beta = 0.341$, $p < 0.001$), responsiveness ($\beta = 0.448$, $p < 0.004$), assurance ($\beta = 0.482$, $p < 0.026$), and empathy ($\beta = 0.434$, $p < 0.000$). These findings align with Ahmed et al. (2021), who demonstrated service quality's significant positive impacts on customer orientation, satisfaction, and relationship quality in 3PL industries, and Rai et al. (2022), who found service quality serves as a critical mechanism for creating customer value and loyalty in B2B logistics.

The particularly strong effect of empathy ($f^2 = 1.545$) supports research emphasizing individualized attention in logistics services, consistent with Gupta et al. (2023) on customization quality and personalized service approaches. The strong performance of responsiveness aligns with Vasan and Yoganandan (2024), who identified responsiveness as highly influential in perceived service quality for international freight forwarding, particularly during

challenging periods.

The lack of support for the tangibles-loyalty relationship ($\beta = 0.341$, $p > 0.215$) represents an interesting departure from traditional SERVQUAL applications and provides insights into SME priorities. For SMEs utilizing 3PL services, operational efficiency and relational benefits take precedence over physical infrastructure. This likely reflects SMEs' resource constraints and focus on cost-effectiveness, as they seek logistics providers delivering operational value rather than luxurious amenities.

The non-significant effect of tangibles likely reflects three key factors: (1) Digital transformation of logistics services has diminished the importance of physical facilities as SMEs increasingly interact through digital interfaces; (2) Resource-constrained SMEs prioritize functional performance over aesthetic facilities that may increase costs without proportional operational benefits; (3) As logistics partnerships become more strategic, decision-makers focus on relational and operational dimensions over physical facilities that may rarely be experienced directly.

The moderating effects of relationship quality provide the study's most significant contribution. Relationship quality substantially amplifies the effects of reliability ($\beta = 0.358$, $p < 0.000$), responsiveness ($\beta = 0.449$, $p < 0.027$), assurance ($\beta = 0.456$, $p < 0.000$), and empathy ($\beta = 0.358$, $p < 0.000$) on customer loyalty, extending Gaudenzi et al.'s (2021) research by providing empirical evidence for relationship quality's amplifying role in service quality combinations.

The particularly strong moderating effect on empathy ($f^2 = 1.248$) aligns with research emphasizing emotional dimensions in B2B relationships. This supports Ghose et al.'s (2021) assertion that emotional connections play crucial roles alongside functional service delivery, as empathetic service within strong relationships creates emotional bonds that significantly enhance loyalty beyond empathy's direct effects.

The significant moderating effects for responsiveness support literature emphasizing responsiveness as a relationship-building mechanism in digital environments (Lin et al., 2023). For SMEs with limited internal logistics capabilities, responsive 3PL providers become critical partners. When responsiveness occurs within strong relationships characterized by trust and commitment, its impact on loyalty is substantially magnified, supporting relationship quality theory predictions.

The moderating effect on reliability demonstrates how operational excellence becomes more valuable within strong relational contexts, consistent with research showing the service quality-loyalty relationship is particularly strong in logistics (Ahmed et al., 2021). The interaction effects indicate that reliable service delivery becomes increasingly valuable as relationships strengthen, suggesting SMEs place greater trust in consistent performance when they have developed strong partnerships with their 3PL providers.

4.5. Theoretical Implications

This research makes several important contributions to service quality and relationship marketing literature. First, it provides robust empirical evidence for the moderating role of relationship quality in the SERVQUAL-loyalty relationship, directly addressing calls in contemporary literature for more nuanced understanding of service quality effects. Recent meta-analytical work has emphasized that service quality effects are contingent upon contextual factors, and this study provides specific, quantitative evidence for relational context as a key moderator in logistics services.

Second, the study contributes to the ongoing adaptation of the SERVQUAL framework for contemporary logistics services by demonstrating that different dimensions may have varying importance and mechanisms of influence in digital and partnership-oriented 3PL contexts. The non-significant effect of tangibles aligns with recent research by Mathong et al. (2020), suggesting that SERVQUAL dimensions in logistics require careful consideration of dimension priorities. Musman et al. (2025) noted that intangible resources demonstrate greater significance than tangible physical assets in value creation processes. This finding supports the evolution of service quality measurement frameworks to emphasize functional and relational dimensions over tangible elements.

Third, the research advances relationship marketing theory by providing empirical evidence for the moderating effects of relationship quality components in contemporary business environments. While previous research has extensively studied satisfaction, trust, and commitment as mediators, their role as moderators in digital and partnership-intensive contexts has received limited attention. The strong moderating effects found in this study support theoretical arguments that relationship quality creates amplifying contexts for service quality improvements, particularly relevant in today's relationship-centric business models.

4.6. Practical Implications

The findings offer several actionable insights for 3PL providers serving SME clients. The significant effects of reliability, responsiveness, assurance, and empathy suggest that 3PL providers should prioritize these dimensions when developing service delivery strategies for SME markets. However, the strong moderating effects of relationship quality indicate that service quality improvements alone are insufficient for building customer loyalty; providers must simultaneously invest in relationship development activities.

The empathy dimension's particularly strong effect

suggests that individualized attention and understanding of SME-specific needs should be central to service delivery strategies. This involves developing account management approaches that recognize the unique challenges faced by SMEs, including increased digitalization requirements and operational flexibility needs. The interaction effects demonstrate that empathetic service delivery becomes exponentially more valuable when embedded within strong relationships, suggesting that providers should view empathy as both a service quality dimension and a relationship-building tool.

The significant moderating effects for responsiveness highlight the importance of developing rapid response capabilities for SME clients, particularly in an era of increased digital communication expectations. Given SMEs' limited internal logistics resources, they depend heavily on 3PL providers for real-time problem resolution and operational support. The interaction effects suggest that responsive service becomes particularly valuable for building loyalty when delivered within strong relationships, indicating that providers should integrate digital responsiveness capabilities into their relationship management strategies.

The non-significant effect of tangibles provides important guidance for resource allocation decisions. While physical facilities and equipment remain operationally important for performance delivery, SMEs prioritize digital capabilities and relational investments over impressive tangible resources. This suggests that 3PL providers serving SME markets should focus investment on digital infrastructure, data analytics capabilities, and relationship-building activities rather than expensive physical infrastructure improvements that may not directly contribute to loyalty development. This finding is particularly relevant in Asian markets, where SMEs often operate with constrained capital budgets and favor functional efficiency over physical impressiveness.

4.7. Limitations

Several limitations should be acknowledged. The study's geographic focus on Thailand may limit generalizability to other cultural contexts. The cross-sectional design prevents establishing causal inferences about relationship development and its influence on service quality perceptions over time. Additionally, treating relationship quality as a meta-construct rather than examining its components separately (satisfaction, trust, commitment) may mask their differential moderating effects on service quality dimensions.

Future research should address these limitations through cross-cultural studies comparing collectivist versus individualistic business environments, longitudinal designs tracking relationship evolution and establishing causal pathways, and detailed investigation of individual relationship quality components' differential moderating effects. Research on digital service quality dimensions, sustainability practices, and comparative studies across various enterprise sizes and industries would enhance understanding of contextual factors influencing these relationships, contributing to more sophisticated theoretical frameworks for service quality management in logistics partnerships.

5. Conclusion

This study investigated the moderating role of relationship quality in the service quality-customer loyalty relationship in 3PL services for SMEs. Analysis of 308 SME responses in Thailand reveals how relationship quality amplifies service quality effects on loyalty in B2B logistics contexts.

Four SERVQUAL dimensions—reliability, responsiveness, assurance, and empathy—significantly influenced customer loyalty, with empathy showing the strongest effect ($f^2 = 1.545$). Tangibles did not significantly impact loyalty, indicating SMEs prioritize operational and relational aspects over physical infrastructure. Critically, relationship quality powerfully moderates the effects of reliability, responsiveness, assurance, and empathy on loyalty, with particularly strong effects for empathy and responsiveness.

These findings advance service quality and relationship marketing literature by providing empirical evidence for relationship quality's moderating role, extending beyond traditional direct-effect models and demonstrating that service quality effects are contingent upon relational context in B2B logistics partnerships.

Practically, 3PL providers serving SMEs should adopt integrated approaches combining service quality excellence with relationship development. Rather than investing heavily in physical facilities, providers should prioritize building strong relationships while delivering empathetic and responsive services, as the moderating effects create multiplicative impacts that substantially enhance service quality investments' value within strong relational contexts.

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Declarations

Ethics Approval and Consent to Participate

This research involved the use of existing data and was determined to be exempt from review by the Institutional

Review Board of Rajamangala University of Technology Isan in accordance with the Declaration of Helsinki, The Belmont Report, CIOMS Guideline, International Conference on Harmonization in Good Clinical Practice (ICH-GCP) and 45CFR 46.101(b).

Competing Interests / Conflicts of Interest
The author declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Author Contributions
Tanyanart Yanpiboon conceived and designed the study, developed the methodology, conducted data collection and analysis, wrote the original draft, critically revised the manuscript, and supervised the entire project. The author has read and approved the final manuscript.

Data Availability Statement
The data that support the findings of this study are available from the corresponding author upon reasonable request.

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