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Partner-specific adaptations, performance, satisfaction, and loyalty in third-party logistics relationships

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Abstract This paper addresses the question of the impact of alternative ways to partner-specific adaptations in third-party logistics provider relationships upon performance, customer satisfaction, and the degree of customer loyalty. It offers a view of related theory and a preliminary analysis of "request for quotation" documents. On this basis, several hypotheses are formulated. A questionnaire survey and structural equation modeling (SEM) are then used to test the hypotheses. The analysis shows that adaptations by logistics service providers exert positive influences on performance and customer loyalty. On the other hand, there is a negative impact of customers' adaptations on performance because own adaptations are perceived as an effort. Nevertheless, the study provides evidence that the total effect of customers' adaptations on customer loyalty is positive. The results suggest that third-party logistics providers should adapt systems and procedures to their customers' specific requirements. Despite the negative impact found of customers' adaptations upon the level of perceived performance, providers should promote moderate customers' adaptations in order to increase customer loyalty.

Keywords Third-party logistics service · Specific assets · Adaptations · Relationship performance · Satisfaction · Loyalty

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1 Two alternative paths to building efficient third-party relationships

The markets for third-party logistics services—also referred to as contract logistics—have grown dramatically since the early 1990s [10, 16, 26]. In Europe, the annual turnover of the third-party logistics business in 2008 is estimated at €93 billion. The potential market volume is believed to amount to €374 billion [25]. The third-party logistics (3PL) business is developing due to the transformation of already existing transaction-based, loose service relationships between shippers and providers, and through continuously increasing trend toward contract-based outsourcing of logistical functions. In comparison with traditional "arm's length" transport and warehousing services, which are being performed transaction by transaction, third-party logistics services "are more complex, encompass a broader number of functions and are characterized by longer term, more mutually beneficial relationships" [1, p. 49]. Third-party logistics services are based on long-term contractual arrangements, and therefore, the terms *third-party logistics* and *contract logistics* can be used synonymously [38, 41, 43]. In the academic literature, this trend leads to an emphasis on the relational approach [26].

Ellinger et al. [14] generally emphasize the importance of customer orientation of logistics service providers. Particularly, third-party logistics services are "individualized logistics services of some complexity and customer specificity" [25, p. 98] and "tailored to an individual customer's requirement" [25, p. 76]. The business model of third-party logistics is essentially based on the creation of customer-specific "customized" services and hence on adaptations by the providers. Specific adaptations to the systems and procedures of the customer as well as extensive monitoring and reporting responsibilities are natural.

Third-party logistics contracts can include detailed stipulations concerning a provider's responsibilities [49], and many third-party logistics providers complain about one-sided adaptation to customers' systems and procedures [29]. In many cases, the customer insists on a specific location, demands-specific procedures, expects the usage of his equipment or requires periodical reports of specific key performance indicators. Consequently, Hertz and Alfredsson [21] emphasize that the ability of customer adaptation is a crucial characteristic of third-party logistics providers.

On the other hand, the adaptation by the customer to standardized, efficient structures and procedures established by the logistics provider may be viewed as an alternative strategy to establish efficient third-party logistics relationships. Providers are specialists in logistics, and therefore, customers could acquire efficient and effective procedures. Furthermore, non-specific equipment of a third-party logistics provider such as existing warehouses can be efficiently used for several customers (multi-user warehouses). Multi-user warehouses offer the opportunity to reduce the volatility of warehouse utilization rates and generate economies of scale [11]. Therefore, as an alternative to adaptations by providers to customers' specifications, adaptations by the customers to the providers' standardized systems and procedures come into the focus of research.

Although there is a growing body of literature on third-party logistics in general [32], scientific knowledge on the impact of mutual adaptations on the performance of third-party logistics relationships is limited and even contradictory. For example, Knemeyer and Murphy [26] found that there is no influence of customer-specific investments on customers' perceptions of the third-party logistics relationship performance. Based on the investigation of general buyer–seller relationships, Cannon and Perreault [6] provide evidence of an influence of specific adaptations on customer satisfaction. Consequently, this paper strives to answer the following research questions:

- What effects on customer's perceptions of relationship performance come from the degree of partner-specific adaptations by both the third-party logistics provider and the customer of a third-party logistics relationship?
- What direct effects on customer's loyalty come from the degree of partner-specific adaptations by both the third-party logistics provider and the customer in a third-party logistics relationship?
- What indirect effects on customer's loyalty come from the degree of partner-specific adaptations mediated by perceived relationship performance and customer's satisfaction?

Literature on third-party logistics, transaction cost theory, and relationship marketing was used to deduce constructs covering the wide-ranging concepts of relationship performance, customer satisfaction, and loyalty as well as customer-specific adaptations in the 3PL business. Preparatory document studies have been used to identify the required degree of partner-specific adaptations in such relationships. A sample of third-party logistics customers was drawn to collect data, and structural equation modeling (SEM) was applied to evaluate the data.

2 Review of literature contributions to logistics performance and mutual adaptation in customer-provider relationships

2.1 Performance, satisfaction, and loyalty

In general, performance could be understood as the degree of goal accomplishment in a third-party logistics relationship [10]. Most of the previous research focused on customers' perceptions of third-party logistics performance. Knemeyer and Murphy [26, p. 39] define third-party logistics performance as the "perceived performance improvements that the logistics outsourcing relationship has provided the user." Performance improvements include, e.g., reduced logistics costs, reduced cycle times, more efficient handling of exceptions, and improved system responsiveness [26, 44]. Stank et al. [47] identify three distinct dimensions of logistics performance: operational performance, relational performance, and cost performance. This research conceptualizes the performance of third-party logistics relationships by using an adapted version of the reflective scale of logistics provider performance used by Stank et al. [46].

Generally, "customer satisfaction is defined as the result of a cognitive and affective evaluation, where some comparison standard is compared to the actually perceived performance" [23, p. 45]. According to the widely used confirmation–disconfirmation paradigm [35, 55], satisfaction is a post-purchase construct, which results from a perceived product or service performance and the degree to which it meets customers' expectations. There is a huge body of literature on customer satisfaction in the field of business-to-consumer research [30]. However, fewer scholars have studied satisfaction in the business-to-business relationships [24, 37]. Customer satisfaction can be regarded as the result of an ongoing evaluation of perceived performance. In this respect, Stank et al. [47] use the construct of customer satisfaction in third-party logistics business to describe customer's contentedness concerning the overall relationship with the provider. According to Cannon and Perreault [6] and Daugherty et al. [9], an adapted scale is used in this research to measure the degree of third-party logistics customers' satisfaction.

Finally, customer loyalty indicates the long-term relatedness between the customer and the provider of a third-party logistics relationship. A high degree of relatedness is crucial because switching costs in third-party logistics are extensive. Therefore, loyalty is a valuable concept reflecting the long-run success of a relationship [9]. Since loyalty is one of the central constructs of customer behavior in consumer marketing, there are countless approaches to operationalization [4]. Oliver [36, p. 392] defines loyalty in general as "a deeply held commitment to rebuy or repatronize a preferred product or service consistently in the future, despite situational influences and marketing efforts having the potential to cause switching behavior." In the third-party logistics business, customer loyalty stands for the commitment of the customer to maintain the relationship and if necessary to renew the contract. Accordingly, in this research, loyalty is measured following Daugherty et al. [9].

2.2 Partner-specific adaptations in third-party logistics relationships

In the first part of this paper, the ability of customer adaptation was introduced as a key characteristic of third-party logistics providers. Hertz and Alfredsson [21] emphasized the importance of the general ability to solve problems and of the ability to undergo customer adaptations. Both characteristics are useful to differentiate between third-party logistics providers and traditional logistics companies, like integrators, standard transport firms, or warehousing firms. Furthermore, Hertz and Alfredsson [21] developed a typology of third-party logistics providers based on these characteristics. So-called customer adapters (providers with a medium ability to solve general problems and a high ability to carry out customer adaptations) usually take over present activities of customers and try to improve the performance of these existing processes. The second type of providers consisting of companies with both a high ability of carrying out customer adaptations and a high ability of solving general problems is described as a "customer developer." This type of firm develops advanced customer solutions for each individual customer.

More common, relationship marketing has emphasized the importance of adaptations by sellers to customers' systems and procedures. Cannon and Perreault [6] developed a typology of customer–supplier relationships from a variety of characteristics that can be regarded as "relationship connectors." These relationship connectors are information exchange, operational linkages, legal bonds, cooperative norms, adaptations by sellers, and adaptations by buyers. Therefore, partner-specific adaptations can be regarded as important characteristics of close relationships. Two types of relationships with extensive adaptations can be found [6]: The first one is the customer-is-king type that involves extensive adaptations only by the seller. The second is the mutually adaptive type that requires adaptations by both the seller and the supplier. Surprisingly, there seems to be limited influence of sellers' adaptations on customer satisfaction [6]. Customer satisfaction with adapted relationships such as customer-is-king is almost as low as customer satisfaction with standard buying relationships. Furthermore, if a business relationship requires considerable adaptations also by the customer (mutually adaptive type), satisfaction is low.

Transaction cost theory is of vital importance to gain a better understanding of adaptations in third-party logistics relationships [31]. As shown in the first section, third-party logistics consist of recurrent, complex services based on a long-term contract between a provider and a customer. For such settings, the transaction cost theory predicts the existence of specific investments by the providers [50, 54]. Asset specificity indicates "a specialized investment that cannot be redeployed to alternative uses or by alternative users except at a loss of productive value" [53, p. 377]. Asset specificity is a precondition to meet the specific requirements of the customer and to support recurrent transactions efficiently [51, 52]. Williamson distinguishes between four important types of asset specificity: site specificity, physical asset specificity, human asset specificity, and dedicated asset specificity [51].

According to Williamson [50, 52], Fig. 1 displays the relationship between frequency, asset specificity, and logistics contract characteristics. Detailed and long-term agreements (hybrid contracting)—like third-party contracts—are necessary to safeguard these specific investments and to reduce the risk of opportunism [54]. Additionally, if the frequency of service transactions is low, it is difficult to recoup the investments in the third-party relationship. Therefore, third-party logistics is not appropriate for occasional transactions. Van Hoek [49] proved that customer-specific third-party logistics services such as final assembly, display building or warehousing are positively related to the existence of detailed contracts.

		Asset specificity		
		No	Medium	High
Frequency	occasional	contract of carriage	forwarding contract	forwarding contract / contract of employment
	Recurrent	contract of carriage / warehousing contract	forwarding contract / cooperation agreement	third-party logistics contract / contract of employment

Fig. 1 Asset specificity and logistics contract characteristics

One driver of asset specificity in third-party logistics is the need for customer-specific performance measurement [28]. Usually, the customer places specific demands on the service provider concerning performance measurement and reporting. For example, the third-party logistics company is required to provide specific key performance indicators and detailed management reports, which enable the customer to monitor the performed service. In order to meet these requirements, the provider is forced to invest in specific data-processing procedures or to adapt to the existing monitoring systems of the customer. Likewise, specialized workforce is necessary to fulfill these special demands.

Summing up, the construct of specific adaptations covers the phenomena of specific investments as well as of behavioral adaptations by both the provider and the customer. Therefore, new scales have been developed to measure providers' adaptations and customers' adaptations. In this research, these scales are based on the items used by Knemeyer and Murphy [26] and Sharland [42].

3 An exploratory study of third-party logistics tender documents

Literature emphasizes the importance of asset specificity and adaptations by third-party logistics providers. To gain some insight into the practice of the design of third-party logistics relationships and actual adaption practices, a preliminary study of tender documents has been conducted. Fifteen third-party logistics tender documents (requests for quotations) have been analyzed. Two major European third-party logistics companies made these documents available to the author. Eight documents relate to customer-specific distribution and warehousing. Seven documents request for physical supply or logistics services in manufacturing, e.g., sequencing activities and materials handling. Most of the customers belong to the automotive industry. Based on the results of literature research, this analysis was focused on the required specificity (site specificity, physical asset specificity, and human asset specificity), the intended procedure of performance evaluation, the expected behavioral adaptation by the provider, and the willingness of the customer to adapt to the provider.

Typically, a request for quotations consists of a text body of more than 50 pages that describes the current state and the specific customer requirements. Additionally, most of the requests include an extensive appendix. Examples are warehouse layouts, annual demand figures, and performance indicators of the existing equipment. Each document describes an individual case and shows individual structure and style. Therefore, the qualitative method of explorative document analysis has been applied [15, 45].

Analyzing the documents, we found that a considerable amount of site specificity is conspicuous. Most of the customers insist on a specific location or at least stipulate that the warehouse must be located in the proximity of their own manufacturing facilities. Furthermore, they expect specific investments by the provider such as warehouses, warehousing equipment, or computer systems. Consistently with these results, Mortensen and Lemoine [34] provide evidence of extensive usage of ICT tools to support the information exchange in 3PL relationships. Therefore, physical asset specificity seems to be a frequent characteristic of third-party logistics. In the case of outsourcing, the provider is typically requested to use existing assets of the customer. Likewise, human asset specificity exists on a regular basis. Usually, there is a need for additional personnel at the demanded location or at least a need for training, to meet the specific requirements of the customer.

As expected, most of the customers place specific demands on the service provider concerning performance measurement and reporting. With a few exceptions, there is limited willingness of the customers to accept providers' performance measures. Generally, the willingness of the customer to adapt to the provider seems to be low. The vast majority of the documents call for one-sided adaptations by the third-party logistics provider.

4 Hypotheses on alternative approaches to relationship adaptation

Previous research concerning the influence of specific investments and behavioral adaptations on the performance of close business relations has presented contradictory results. Knemeyer and Murphy [26] found that the level of specific investments by a provider is not related to a buyer's perception of 3PL performance. Furthermore, relationship marketing suggests limited influence of sellers' adaptations on customer satisfaction [6]. In contrast, customers of third-party logistics firms expect tailored logistical solutions [43]. Furthermore, the transaction cost theory expects a positive impact of asset specificity on the performance of 3PL. Specific assets improve the performance of 3PL relationships, because the usage of specific assets enhances the productivity of third-party services in comparison with general purpose technology [53, 54]. Following the transaction cost theory, a positive relationship between a customer's perception of the 3PL performance and the level of specific adaptations made by the provider is expected:

H_1 The level of specific adaptations by the provider influences the customer's perception of the third-party relationship performance positively.

As shown above, document studies of request for quotations demonstrate limited willingness of the customers to adapt to the providers systems and procedures. One important reason for this phenomenon could be that one's own adaptations increase customers' cost and therefore exert negative influence on customers' perceptions of third-party logistics relationship performance. In general, Morris et al. [33] postulate a low willingness of customers to change their behaviors and procedures in order to enhance cooperation with their suppliers. Artz [3] shows a negative relationship between the level of customers' specific investments and the performance of supplier–customer relationships. Likewise, Heide and Stump [19] found evidence of a negative impact of own investments in supplier-specific assets on the perception of relationship performance. We can assume that these general effects are also observable in the special case of third-party logistics relationships. This leads to the following hypothesis:

H_2 The level of specific adaptations by the customer influences the customer's perception of the third-party relationship performance negatively.

As shown in the literature section, third-party logistics relationships based upon specific investments and adaptations by the provider to perform the demanded logistics efficiently and to fulfill customers' special requirements. In such a kind of business, customer loyalty is crucial, because switching costs are extensive. For example, switching costs are caused by contract penalties or a loss in the value of specific assets [53]. To safeguard these specific assets, third-party logistics relationships are predicated on long-term contractual arrangements with contract periods between 3 and 5 years and the opportunity to renew the contract. Furthermore, asset specificity contributes to the commitment of both parties, resulting in a trustful relationship between the partners. Kwon et al. [27] proved that supply chain partners' investments increase the level of trust between the partners, because these investments are perceived as a signal of commitment. Transaction-specific investments exceed positive influence on customer's perception of a provider's benevolence, because these adaptations demonstrate the willingness of the provider to support and maintain the relationship [22]. These ideas suggest the following hypothesis:

H_3 The level of specific adaptations by the provider influences the customer's loyalty positively.

On the other hand, Kwon et al. [27] consider that a customer's own investments exert a negative influence on the level of trust in the other party. Heide and John [19] provide evidence that customers' investments in specific assets reduce the likelihood to control the supplier. At the first glance, the influence of specific adaptations of the customer on customer loyalty seems to be rather negative. Nevertheless, following transaction cost theory, customers' investments in specific assets could support customer loyalty due to effects of customers' dependency on the provider. If adaptations by the customer occur, "such transactions give rise to bilateral dependencies, in that the parties have incentives to promote continuity, thereby to safeguard specific investments" [54, p. 9]. Furthermore, Hofer et al. [22, p. 149] found that "a customer is more likely to partner with a 3PL when it perceives itself to be dependent on the 3PL's expertise in providing logistics services." Therefore, in this paper a positive relationship is assumed:

H_4 The level of specific adaptations by the customer influences the customer's loyalty positively.

Although no direct impact of adaptations on customer satisfaction is considered in this research, the construct of customer satisfaction is included into the model to mediate the relationship between performance and loyalty. The positive relationship between performance and customer satisfaction is a widely recognized phenomenon in consumer marketing as well as in business-to-business marketing. For example, Patterson et al. [37] provided evidence of a positive impact of performance on customer satisfaction in business-to-business relationships. Moreover, Homburg et al. [24] demonstrate positive influences of perceived quality and perceived flexibility on the satisfaction of industrial customers.

In marketing research, customer satisfaction is recognized as a main influence of loyalty [30, 40]. For example, Daugherty et al. [9] show that buyers' satisfaction of grocery, drug, and discount chain stores has a strong impact on their loyalty. Consequently, positive connections are also hypothesized in the case of third-party logistics relationships:

H_5 The customer's perception of the third-party relationship performance influences the customer's satisfaction with the third-party logistics relationship positively.

H_6 The customer's satisfaction with the third-party logistics relationship influences the customer's loyalty positively.

5 Method: an analysis based on structural equation modeling

5.1 Sampling and data collection

To examine the six hypotheses, a two-part questionnaire was designed. The first part of the questionnaire consists of general questions about third-party logistics. The second

part refers to a specific third-party logistics relationship of the company. Reflective multi-item scales were used to measure the constructs. Proven scales were modified to be suitable for the third-party logistics business [6, 9, 26, 42, 46].

As there is no directory of "3PL-customers" available in Germany, we addressed the invitation letter to well-known customers and to companies we regarded as probable users of third-party logistics services. Following this procedure, the questionnaire was distributed by e-mail to 400 purchasing or logistics managers in industry and trade. Furthermore, the logistics newsletter of the German Association of Purchasing and Logistics (BME) was used to enlist additional participants. In total, 79 customer questionnaires were returned, resulting in a response rate of 19.7%. Out of this, 51 firms are actually involved in third-party logistics relationships. Therefore, 51 cases are available for statistical evaluation. A non-response bias test was conducted to examine differences in early and late returns [2] and showed that non-response bias is unlikely to be an issue in interpreting the results of this study.

5.2 Structural equation modeling with partial least square (PLS)

Structural equation modeling (SEM) has been used to prove the hypotheses. The SEM approach combines a path model (relationships among the constructs) and a measurement model (set of items for each construct) [17, 18]. Figure 2 shows the hypothesized path model. The measures are given in the "Appendix".

SmartPLS 2.0 [39] was selected for data analysis. This structural equation modeling (SEM) software package is an application of the partial least square method (PLS) [7, 48]. In contrast to covariance-based procedures, the PLS algorithm is appropriate if the model is complex and the sample size is small [7]. Covariance-based SEM procedures such as LISREL or AMOS perform a simultaneous estimation of the totality of the model parameters. Therefore, these procedures require very large samples, especially if models are complex [5]. In contrast, the PLS estimation is based on a set of distinct multiple regressions. Following the recommendations of Chin and Newsted [8], the sample size in PLS estimation should be at least ten times either the largest number of formative indicators or the largest number of independent variables influencing a dependent variable of the structural model. In this research, the measurement model consists of reflective indicators exclusively. Therefore, only the second criterion is relevant. The dependent variable with the largest number of predictor variables is "loyalty." This number is 3. Thus, the number of usable cases should be at least 30. Based on this recommendation, the sample meets the sample size requirements of PLS. In comparison, AMOS would estimate 67 parameters simultaneously and consequently would need more than 300 cases following the recommendations of Bentler and Chou [5]. Furthermore, the PLS approach is more suitable for explorative studies where the level of theoretical knowledge and the availability of proved scales is rather low [7].

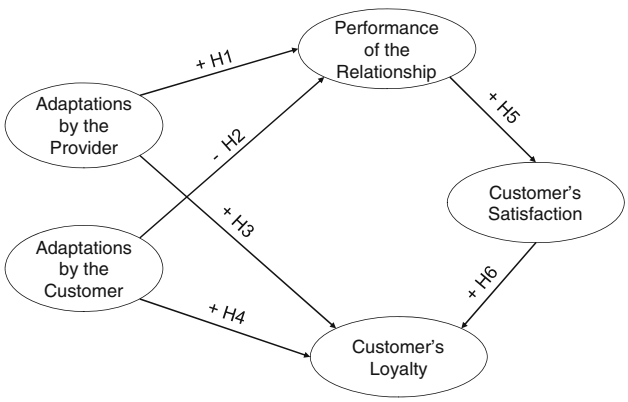

Fig. 2 Hypothesized path model

5.3 Measurement assessment

An important precondition for structural equation modeling is measurement assessment of each single construct, especially in the case of new or modified scales. In this study, the path model consists of five latent variables. According to the chosen scales, a reflective measurement model was employed. Reliability analysis and explorative factor analysis using SPSS were performed. The evaluation is based on the criteria provided by Hair et al. [18]. After scale purification, the analysis results in unidimensionality of each construct and sufficient degrees of reliability and convergent validity (Table 1).

Finally, SmartPLS was used to evaluate the scales of the model. Common criteria to evaluate reflective measures of PLS path models are the average variance extracted, the composite reliability and the communality (Stone-Geisser Q^2) [7]. The results of these calculations are shown in Table 2. Each of the constructs meets the requirements.

6 Quantitative results

The path relationships (standardized regression coefficients) of the model have been estimated using SmartPLS. Additionally, the bootstrap procedure [12, 13] has been used with 50 cases and 200 samples to obtain t-statistics in order to evaluate the significance of the parameters. The results of these estimations are shown in Table 3 and Fig. 3.

Table 1 Reliability and validity of the measuring model (calculations using SPSS)

Construct	Indicator	Cronbach alpha >0.7	Loading >0.7	Variance explained >50%
Performance of the relationship (PERF)	PERF1	0.84	0.797	76.71
	PERF2		0.897	
	PERF3		0.928	
Satisfaction (SAT)	SAT2	0.93	0.947	75.87
	SAT3		0.883	
	SAT4		0.850	
	SAT6		0.886	
	SAT7		0.769	
	SAT8		0.882	
Loyalty (LOY)	LOY1	0.72	0.828	64.30
	LOY2		0.740	
	LOY4		0.834	
Adaptation by the provider (PSPEZ)	PSPEZ1	0.74	0.926	66.87
	PSPEZ2		0.859	
	PSPEZ5		0.641	
Adaptation by the customer (CSPEZ)	CSPEZ1	0.76	0.908	68.56
	CSPEZ2		0.898	
	CSPEZ4		0.652	

Table 2 Evaluation based on SmartPLS

	Average variance extracted >0.6	Composite reliability >0.7	Stone-Geissers Q^2 (communality) >0	Cronbach alpha >0.7
Performance of the relationship	0.77	0.91	0.77	0.85
Satisfaction	0.76	0.95	0.76	0.93
Loyalty	0.64	0.84	0.64	0.72
Provider's adaptations	0.67	0.85	0.67	0.74
Customer's adaptations	0.67	0.85	0.67	0.76

Table 3 Parameter estimation (calculation with SmartPLS)

		PLS path coefficient	Bootstrap sample mean	Standard error	*t*-value	Significance
PSPEZ ⇒ PERF	H_1	0.63	0.63	0.084	7.536	0.000
CSPEZ ⇒ PERF	H_2	−0.41	−0.39	0.115	3.556	0.000
PSPEZ ⇒ LOY	H_3	0.37	0.36	0.125	2.918	0.004
CSPEZ ⇒ LOY	H_4	0.25	0.26	0.110	2.301	0.021
PERF ⇒ SAT	H_5	0.91	0.91	0.030	30.079	0.000
SAT ⇒ LOY	H_6	0.41	0.43	0.157	2.625	0.009

Each of the hypotheses is fully supported by the analysis. In support of H_1, there is evidence that adaptations by the third-party logistics provider (PSPEZ) exert positive direct influence on the performance of the relationship (PERF). As H_3 predicts, the estimation indicates that third-party logistics provider's adaptations exert positive influence on the degree of loyalty (LOY). In H_5 and H_6, we expect connections between relationship performance, customer satisfaction, and customer loyalty. The data also strongly support these hypotheses. Therefore, the direct impact of perceived provider adaptations on customer loyalty is strengthened by an indirect influence mediated by relationship performance and customer satisfaction resulting in a strong total effect of 0.60.

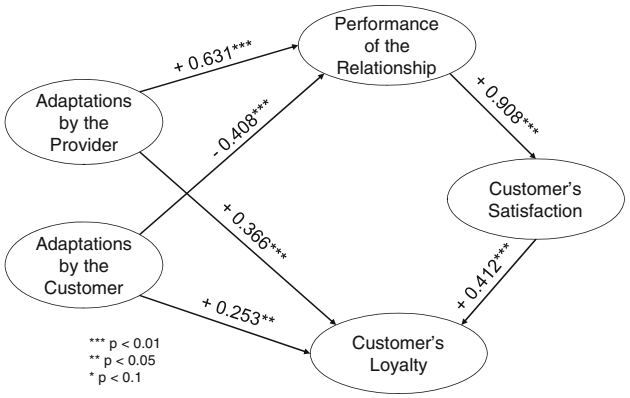

Fig. 3 Approved path model (Standardized Regression Coefficients)

Since one's own adaptations are recognized as an additional effort, there is a negative impact of specific adaptations by the customer (CSPEZ) on the level of perceived relationship performance. If customers have to adapt to providers, they will judge the performance of the resulting relationships as inadequate. Therefore, the data support H_2. Furthermore, the strong positive impact of the perceived relationship performance (PERF) on customer satisfaction has to be considered (H_5)—this impact causes an indirect negative effect of customer's adaptations on customer satisfaction (−0.37).

The positive direct effect of the adaptations by the customers on the degree of their loyalty (LOY) corresponds to the predictions of the transaction cost theory that assumes mutual commitment in the case of partner-specific adaptations [50, 54]. Thus, the data support H_4. However, this direct effect will be slightly weakened by a negative indirect effect of CSPEZ on LOY (−0.15), mediated by PERF and SAT. In total, the influence of CSPEZ on LOY is positive (0.10).

The coefficients of determination (R^2) for each dependent construct deliver insight into whether the independent variables of the model exert substantial influence on this construct [7]. Altogether, the values of the coefficients of determination (R-square) of PERF ($R^2 = 0.53$), SAT ($R^2 = 0.82$), and LOY ($R^2 = 0.53$) give evidence that the model is appropriate.

7 Discussion and management implications

This study delivers a better understanding of the nature of partner-specific adaptations and the influence of these adaptations on the performance of third-party logistics relationships and on customer's loyalty. These findings have some consequences and helpful managerial implications.

The first implication of this study relates to the importance of providers' specific adaptations. As shown in the results section, sufficient behavioral adaptations and/or transaction-specific investments by providers are crucial for third-party logistics performance and customer satisfaction. Adaptations by the service provider are an essential element of the third-party logistics business and therefore being expected by the customer [21]. As predicted by the confirmation–disconfirmation paradigm [35], insufficient adaptations by the provider lead to poor performance evaluations and hence to customer dissatisfaction. Consequently, we suggest that third-party logistics providers should adapt their own systems and procedures to customers' specific requirements. Examples are the acceptance of customer-specific locations, the usage of existing facilities, and the application of customers' IT systems. Furthermore, logistics providers should enhance flexibility and customer orientation as well as the skills and the expertise of own personnel in order to meet the specific requirements of the customer.

On the other hand, since one's own behavioral adaptations and specific investments are sensed as an effort, there is a negative impact of customers' adaptations on relationship performance. This result corresponds to the insights of Artz [3] and Heideand Stump [20] concerning the adaptations of customers in general supplier–customer relationships. Nevertheless, maybe this is rather a matter of customers' preconception than of their rational assessment. Therefore, customers should seriously evaluate own contributions and be aware of possible positive effects of own adaptations. Especially, they should assess the application of efficient approaches such as multi-user warehouses without prejudice.

Thirdly, providers' adaptations exert strong positive direct and indirect effects on the degree of customer loyalty. Therefore, providers should accept specific investments such as specific locations to maintain third-party logistics relationships and enhance the probability of contract renewal. Fourthly, this study provides evidence that the total effect of customers' adaptations on customer loyalty is positive. This leads us to suggest that providers should promote moderate customers' behavioral adaptations and customers' investments in specific assets. In the long run, customers' adaptations may increase the probability of contract renewal. However, this paper has also highlighted the negative influence of these adaptations on the perceived level of performance and on customer satisfaction. Therefore, in a provider perspective, specific adaptations should be mutual in order to equalize negative influences of customer adaptations on performance by the positive effects of provider adaptations. This outcome corresponds to the predictions of the transaction cost theory that assumes mutual commitment in the case of partner-

specific adaptations [50, 54]. On the other hand, customers should be careful with their own adaptations to avoid one-sided dependence caused by being locked into the relationship. Summing up, managers involved in third-party logistics should be aware of the complex consequences of specific adaptations on customer loyalty.

8 Suggestions for future research

There are several limitations to this study that should be dealt with in future research. The most important limitation is the small size of the sample. The reason for this small sample size is the comparatively small number of third-party logistics relationships operating in Germany. Although PLS is a suitable method, larger samples would allow to use covariance-based methods like AMOS or LISREL. The most important advantage of AMOS or LISREL is the availability of goodness-of-fit statistics to evaluate the overall quality of a structural equation model. Further research should try to receive larger samples by collecting data in more than one single country.

Second, this research is focused on customers' perceptions of partner-specific adaptations and third-party logistics relationship performance. It is conceivable that providers would have divergent perceptions and points of view. We can especially assume that from a provider's perspective, the effects of adaptations by the customer on performance and loyalty are not the same as in the case of customers' data. Therefore, additional work should investigate providers' perceptions of partner-specific adaptations and third-party logistics relationship performance.

Appendix

See Table 4.

Table 4 Items used in the questionnaire

Construct	Indicator	Statement	Source
Performance of the relationship	PERF1	My firm's association with this service provider has been a highly successful one	[46] (adapted)
	PERF2	This third-party logistics service provider leaves a lot to be desired from an overall performance standpoint	
	PERF3	If I have to give this service provider a performance appraisal for the past year, it would be outstanding	
	PERF4	Overall, I would characterize the results of my firm's relationship with this service provider as having exceeded our expectations	
Loyalty	LOY1	The relationship that my firm has with this third-party logistics provider is something we are very committed to	[9] (adapted)
	LOY2	The relationship that my firm has with this one is something we intend to maintain indefinitely	
	LOY3	The relationship that my firm has with this provider deserves our maximum effort to maintain	
	LOY4	Maintaining a long-term relationship with this provider is very important to my firm	
Satisfaction	SAT1	Our firm regrets the decision to do business with this provider	[6, 9]
	SAT2	Overall, we are very satisfied with this provider	
	SAT3	We are very pleased with this provider's work	
	SAT4	Our firm is not completely happy with this provider	
	SAT5	If we had to do it all over again, we would still choose to use this provider	
	SAT6	We are delighted with our overall business relationship with them	
	SAT7	We wish more of our providers were like this one	
	SAT8	It is a pleasure to deal with this provider	
	SAT9	There is always some problem or another with this provider	
Adaptation by the provider	PSPEZ1	This third-party has changed its way of working to be able to cooperate with its business	[26, 42] (adapted)
	PSPEZ2	This third-party has tailored its services and procedures to meet the specific needs of our company	
	PSPEZ3	This third-party would find it difficult to recoup the investments in our company if our relationship were to end	
	PSPEZ4	This third-party made considerable investments in tools and equipment in its relationship with us	
	PSPEZ5	Gearing up to deal with us required highly specialized tools and equipment	
Adaptation by the customer	CSPEZ1	We changed our way of working to cooperate with the business of this provider	[26, 42] (adapted)
	CSPEZ2	We have tailored our procedures to meet the specific needs of this provider	
	CSPEZ3	We would find it difficult to recoup our investments in this provider if our relationship were to end	
	CSPEZ4	We have made considerable investments in tools and equipment in our relationship with this provider	
	CSPEZ5	Gearing up to deal with this provider required highly specialized tools and equipment	

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